

Sanna Heikkinen

Challenges and Motivational Aspects to Gain 55 ECTS Per Year

School of Electrical Engineering

Thesis submitted for examination for the degree of Licentiate
of Science in Technology.

Espoo 15.8.2014

Thesis supervisor:

Prof. Jussi Rynänen

Thesis advisor:

PhD Kirsti Keltikangas

Tekijä: Sanna Heikkinen		
Työn nimi: Haasteet ja motivaatiotekijät 55 opintopisteen vuosittaiseen saavuttamiseen		
Päivämäärä: 15.8.2014	Kieli: Englanti	Sivumäärä:7+62
Mikro- ja nanotekniikan laitos		
Professori: Piiritekniikka		Koodi: S-87
Valvoja: Prof. Jussi Rynänen		
Ohjaaja: FT Kirsti Keltikangas		
<p>Tässä työssä on tutkittu erilaisia opiskelun haasteita ja motivaatiotekijöitä, joita opiskelijat kohtaavat. Lähtökohtana oli 55 opintopisteen vuosittainen saavuttaminen, johon tavoiteltu määrä Aallon Sähkötekniikan korkeakoulun opiskelijoista ei pääse. Tavoitteena oli selvittää opiskelijoiden näkemyksiä ja mielipiteitä omista opinnoistaan. Työn tutkimusosuus on tehty Tallinnan teknillisellä yliopistolla, jossa on käytössä erilaiset opetusmenetelmät kuin kuvatussa kohteessa Aalto-yliopistossa.</p> <p>Viron ja Suomen koulujärjestelmiä on verrattu, mutta suurempia eroja ei löydetty. Lisäksi mainituissa maissa on hyvin samalaiset yliopistotason koulutusjärjestelmät. Opiskelijoiden opintomenestyksiä muissa Suomen teknillisissä yliopistoissa on myös verrattu Aalto-yliopistoon.</p> <p>Työ toteutettiin kvalitatiivisena tutkimuksena haastatteluilla ja sekä opiskelijoita että opettajia haastateltiin. Tavoitteena oli hakea vastauksia, kuinka opetusta Aallossa tulisi muuttaa ja onko Tallinnassa tarjottu malli opiskelijoiden mielestä toimiva. Opiskelijat kuvailivat toimivia ja toimimattomia opiskelukäytäntöjä ja antoivat hyviä ohjeita siitä, millä tavalla heidän oppimistaan ja opiskelimoituaatioon voidaan tukea. Yhtä selkeää linjaa ei ollut. Työssä löydettiin useita opiskelijoiden suosimia opetus- ja opiskelutapoja, joista aktiiviset oppimismenetelmät ja jatkuva arviointi nousivat selkeimmin esille. Sekä opettajat että opiskelijat toivat esille samanlaisia toimintoja opiskelijoiden motivaation ja oppimisen edistämiseksi.</p>		
Avainsanat: Motivaatio, ECTS, yliopistokoulutus		

Author: Sanna Heikkinen

Title: Challenges and Motivational Aspects to Gain 55 ECTS Per Year

Date: 15.8.2014

Language: English

Number of pages:7+62

Department of Micro- and Nanosciences

Professorship: Electronic Circuit Design

Code: S-87

Supervisor: Prof. Jussi Ryyänen

Advisor: PhD Kirsti Keltikangas

I have concerned on different challenges and motivational aspects on studies in this research work. The basis was the gaining of 55 ECTS per year which the eligible amount of students do not gain in Aalto University School of Electrical Engineering. The target was to work out the students' point of view of their studies. The research part has been done in Tallinn Technical University where they use different types of teaching methods than in the earlier mentioned Aalto University.

Estonian and Finnish school systems were compared but not any larger difference were found. Furthermore, both countries have similar university level education system. Success in studies in other technical universities in Finland are also compared to the success in Aalto university.

The work was done as qualitative research interviews and both students and teachers were interviewed. The target was to find answers how to change the teaching in Aalto and if the given model in Tallinn is suitable from the student point of view. The students described well working and not well working study habits and offered useful tips how to support their learning and motivation. There was not one clear answer. The study found several teaching and studying styles favoured by the students. The active learning and continuous evaluation emerged clearly. The teachers and students mentioned similar activities for helping students' motivation and learning.

Keywords: Motivation, ECTS, Higher Education

Preface

It was a pleasant and various semester in Tallinn. Maximum thanks for that go to D.Sc. Zoja Raud and the electrical engineering students in TUT. You made me feel comfortable and gave me all the support I needed. I want to give recognition to Professor Jussi Rynänen who allowed me to leave my normal duties and move 80 kilometers to South. I should also thank my husband Timo, who really allowed me to move and live my dreams.

The biggest thanks go anyway to my advisors PhD Kirsti Keltikangas and D.Sc. Ari Korhonen who have been such inspiring colleagues all the time and who made this thesis possible at the end.

Otaniemi, 15.8.2014

Sanna Heikkinen

Contents

Abstract (in Finnish)	ii
Abstract	iii
Preface	iv
Contents	v
Symbols and Abbreviations	vii
1 Introduction	1
2 University Studies and Motivation	3
2.1 Basics of The Studying	3
2.2 Motivation	5
2.3 Finnish and Estonian School Systems	6
3 Research Questions	9
4 Research Methodologies and Data Collection	10
4.1 Research Methodology	10
4.2 Sample Group	13
5 The Student Point of View	17
5.1 Interviews	17
5.2 Teachers and Teaching Methods	17
5.3 Workload	28
5.4 Personal Interests, Goals and Motivation	31
5.5 Language and Culture	35
5.6 Official and Unofficial Support	41
6 The Faculty Point of View	44
7 Discussion	49
7.1 Target	49
7.2 Differences in the Two Universities	49
7.3 Motivational Aspects	50
7.4 Later Benefits in ELEC	52
8 Conclusions	53
References	54

A**Face-to-Face Interview for a Student 60**

A.1 Background 60

A.2 About Your Skills in English Language 60

A.3 About Your Studies 60

A.4 Motivation and Workload 61

B**Face-to-Face Interview for a Faculty Member 62**

B.1 Background 62

B.2 About Your Teaching 62

Symbols and Abbreviations

Abbreviations

ECTS	European Credit Transfer and Accumulation System
ELEC	School of Electrical Engineering (in Aalto University)
EST	Degree program of Electrical Engineering (in Aalto University)
EU	European Union
TKK	Helsinki University of Technology (Teknillinen Korkeakoulu)
TTY	Technical University of Tampere
TUT	Tallinn Technical University

1 Introduction

Lately, the issue of new ECTS (European Credit Transfer and Accumulation System) limit has received considerable critical attention in the Finnish universities. The new funding model in higher education and how the new 55 ECTS limit effects on it have been in the center. Ministry of Education and Culture in Finland announced the new funding model, law 20.4.2012/182, for Finnish universities. In this new model the criteria for the contribution of education is connected to the amount of ECTS students are achieving per year. [51] That has been an effective motivation to ask from the students what generates a motivating course and to solve reasons why students are struggling and if the 55-credit-limit is even realistic target at the moment in technical field. We in Aalto University in School of Electrical Engineering, ELEC, are still in a progress to develop our bachelor's degree studies. The target is to create more motivating courses and offer also something else than only lectures and exams. To find a special group of students for interviews I decided to travel to another university where they already have this opportunity. The target was Tallinn University of Technology, TUT, where some courses use active learning as a main teaching and studying method.

The main problem in studies in Aalto University, ELEC, is that many students do not reach the expected amount of ECTS. When studies are more arduous during the first years, they do not have a possibility to gain enough ECTS to graduate and get their bachelor of science degree ready in three years. The problem is not only in Aalto University but also in some other technical universities in Finland [64].

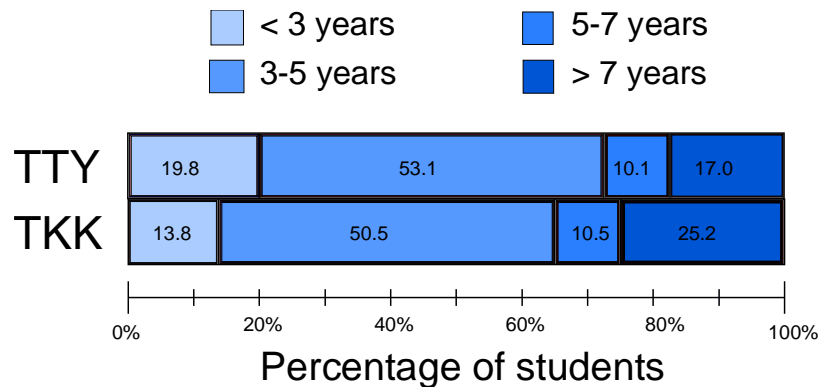


Figure 1: Estimated graduation times for bachelor of science degree in two technical universities in Finland. The target group students have started their studies in 2007. [64].

In Figure 1 there are some statistics from TKK, Teknillinen Korkeakoulu, the former version of the technical schools in Aalto University, and from TTY, Technical University of Tampere. It is easy to notice that less than one fifth of the students could graduate in expected three years. It is still appropriate to notice that about 64% of students in TKK and 73% of students in TTY would be able to graduate no more than in five years.

It is important to note that a student in a university in Finland has a right to study in a bachelor program 3+1 years and they are accepted in a master's program automatically. Together with a master's program they have 5+2 years time to study. In this perspective it is not fatal if a student receives his bachelor's degree in four or five years because it is still possible to graduate in a right time. [64]

Students have mentioned several problems, for example unmotivating courses, poorly organized courses, problems with time management and how to divide it into several tasks and a lack of motivation. Some students mentioned also family, health and activity in student organization. Half of the students felt that their workload was easier to handle on the third year. [64] In this light I started to search suitable courses in TUT and interview students to find out what produces them successful and why most of them achieve advantageous grades. I collected all the data for this thesis when I was working and studying as a post-graduate exchange student in Tallinn Technical University during the spring term 2014.

2 University Studies and Motivation

2.1 Basics of The Studying

The bachelor level courses and the method of thinking in technical field is the base of growing to be an engineer in the future. A faculty member has to concentrate on helping students to become engineers. Some students manage to survive even if we teach and organize poorly designed courses but the normal technique to study and learn is to take a motivating course. However, poorly organized courses have existed as long as there have been students. Faculties in some universities have conducted research on the aforementioned problems' [4].

It may be easy to accuse teachers or other university faculty when students do not success but this does not explain it all. This is exemplified in the work undertaken by a group of researchers. They have created a model how to explain students' drop out in business studies. Individual self-esteem had a significant role. An academic performance, student motivation and satisfaction were explored as a part of the model. [8]

Before accusing anyone it is important to understand, what learning is, how to measure it and how to define the target. Occasionally it is easy to forget the purpose of learning and then it is difficult to evaluate it. It indicates that we have to define the term learning.

By definition, learning is a change in one's behaviour. It is a result of a learner's interaction with an experience. All learning is considerably connected with the foundation of already known skills and learned knowledge. Learning requires to build mental representations or models. Occasionally cooperation while learning can result also more individual learning than an effort made alone. Usually sharing the knowledge you already can facilitate learning. [49] There are various techniques to effect on a learning situation and also individual methods to learn. Learning itself has many levels and there are several procedures to teach too. It is not clear what kind of teaching provides the best results for learning but it should make sense that a student may use several learning styles.

Meaningful learning and learning with understanding are frequently used as synonyms. This type of learning is one of the most important goals when concerning on learning. For example, universities often require scientific understanding, but currently there is not many examples of it in research papers. If using the statement that the learning with understanding is an advantageous target, the university should also explain how to help a learner to learn. [49] Offering challenging and constructive assignments prepare our students to be engineers. It may require more of teacher's time and resources, but it is their task to help students. However, the key aspects of learning is that it is the student's responsibility to learn.

The aim of traditional lectures is to offer information and instructions. This does not signify that a traditional lecture could not be used in active learning. It is important to notice that in most of the cases information proceed well from the front to the back side of the hall but not vice versa. It does not move well from side to side either. An active lecture suggests that you need to challenge

students' mental models. Typically this indicates questions to the students. The most important structure in lectures is to remember to leave some time to think and create a solution. [49] A typical lecture in a technical university does not require much thinking and it may be easy to lose the concentration on the lecture. Students may begin to think their own thoughts, and currently it is increasingly common to spend time in a social media even over the lectures. One question that needs to be asked, however, is spending time in a social media typically waste of time. It can provide inappropriate result because students possess a connection to the topic all the time and have also somewhat a view of experiences over the lecture.

The material for creating new and learning concepts comes from experiences. The experience can be a first-hand type or provided by others. There are several levels of concepts. Some are very basic, such as 'current' in electronics. Without understanding basic level concept it can be difficult to understand wider or higher level concepts, such as 'Ohm's law'. [24] There are several methods to learn the concepts and various types of learning. Frequently there is not only one kind of students in a class room.

There are four approaches to learning. Surface passive learning indicates typically mentioning of various concepts. Surface active learning is more describing, looking for facts and examples. Deep passive learning implies understanding, but not concentrating on examples and details. Deep active learning is explaining, relating the facts to personal experience. [25] A threshold concept creates the main basis for understanding a field [48]. Surface passive learning oriented student can remember and name single areas but cannot explain deeply how to use them or apply the knowledge in practice. In Surface active learning a student may be able to explain how to use a concept but cannot apply it in practice. In deep passive learning a student can understand more and apply the knowledge on some level and present some examples but may not be able to use the knowledge in a practical case. In deep active learning a student can apply the knowledge in basic cases and use other knowledge and his own experience when observing new situations.

Entwistle & al. [26] have created one model of learning electronic engineering that is shown in Figure 2. The model of learning consists of methods of thinking and practising, lectures and other materials, laboratory assignments and simulations, other assignments, experiences and assessment. Tutorials and support from other students is an important factor. Such a model shows that learning cannot take place only in lectures or studying alone at home. It consists of several learning methods and social influences.

In the engineering field, problem solving is one of the main skills. However, students are used to find a ready equation where to place all the given numbers and get the solution easily. Furthermore, it is not difficult to notice that even those students who have passed an exam, can display poor understanding. They can repeat what they have learned but they may not be able to apply to information in other contexts. [22] Can we call such a learning really learning or is it only repeating? It may be useful in a field where a student studies for a clearly described profession. The field of electrical engineering rarely contains two exactly similar careers. This type of studying does not prepare students for a real working life at

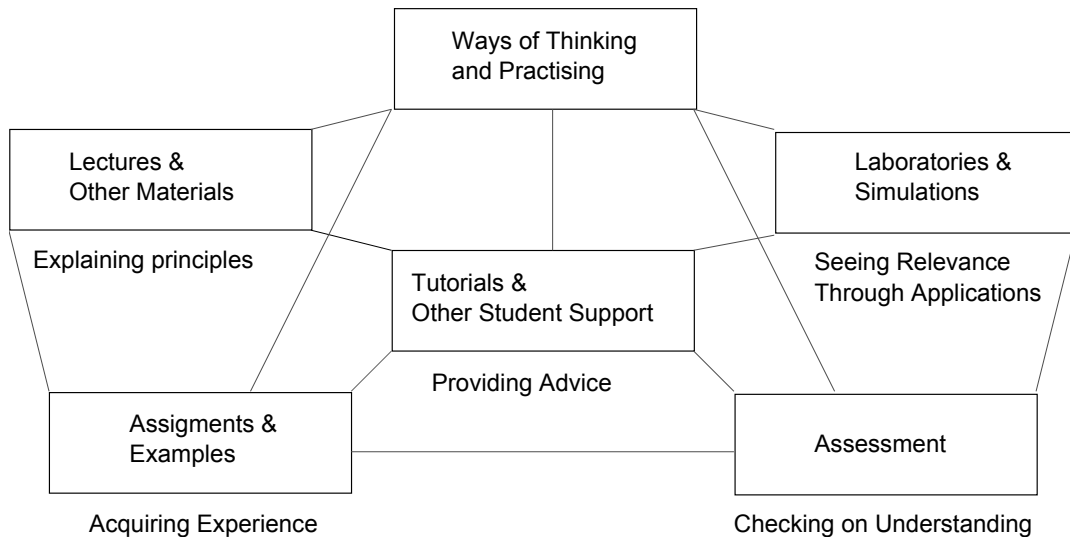


Figure 2: The teaching-learning environment in electronic engineering by Entwistle et al. [26].

all. According to traditional stereotypes, engineers are described to be quiet and unsocial. Despite of this they cannot avoid social contacts and creative thinking in real working life situations.

Students can have various levels of communication skills, but at teacher's point of view suitable engineering students can use the technical concepts swimmingly. Also, depending on the situation, they can present relevant opinions and argue for or against other solutions. They are able to develop concepts through discussion, present views and solutions clearly in both speech, as well in writing, and explain the technical matter for a variety of audiences. This group of students can also show confidence in expressing themselves within the field. [22] As it can be seen, the whole problem solving theory is greatly more than just placing numbers in equations.

2.2 Motivation

In earlier research on motivation students have been categorized into three different groups. Students who are avoiding work belong to the one group. They are lazy but have active social life. They have fun and they enjoy their life and they are mostly having a time out to decide what kind of career they would like to have in the future. The second group of students are improving life skills, furthering academic interest, gaining control of own life and reaching personal potential. The third group consists of students who are improving chance of getting better job, developing career, getting an advantageous qualification and improving standard of living. [54] In a real life students may not be easy to connect with a single category but the point is to show that there are still several kind of people studying in a university. If there are several types of students in one course, there may be needs for several methods in learning as well. The level of motivation and the reason to study are not the same.

There are students who do not know why they are studying in a university and who think that they do not have much control over what occurs in their life. Those students are usually connected with a category of amotivation. That is related to the group one kind of students. [67]

People do frequently think that students who have high achievement motivation would automatically gain higher grades. Or students with intrinsic motivation would perform better than students with extrinsic motivation. Usually intrinsically motivated students are expected to get a deeper understanding and also that they would not be discouraged if getting a poor grade. Unfortunately there is not clear evidence of any of these expectations. [30] However, if there is not evidence of a variety of student types correlating with motivation types, there have been several methods to measure student's motivation [5][46].

The academic motivation scale is over 20 years old and has 28 items which are assessing three types of intrinsic motivation, three types of extrinsic motivation and amotivation [75]. Another method to measure motivation is the motivated strategies for learning [60]. It is a questionnaire which contains 81 items. It has an efficient reliability but it is also US-orientated and because of that not widely used. The third technique to measure motivation is the study process questionnaire [10]. It has three factors and contains 42 items. It has been redeveloped recently. The new version contains only 20 items and is very practical for use [11]. In this work we are not concentrating on the types of motivation but the procedure how it would be possible to get more students to gain better results despite of their motivational level.

2.3 Finnish and Estonian School Systems

This study has been done in Estonia and the results will be used in Finland. The results should be comparable after comparing the Finnish and Estonian school systems. The backgrounds of children and their later possibilities to study in higher level are evaluated in this chapter.

Because Estonia is a minute country, as is Finland too, different type of expertise and line of business is required than in larger countries. The human resources are more valuable in smaller countries. Such countries have more limited natural resources and are more dependent on the knowledge and skills. Education is more important and should be the highest priority in a country. [57]

The main goal of Finnish education policy is to provide equal basics of learning to all citizens. The system is equal in spite of financial situation, sex or any other aspect. In Finland universities select their students independently. Every year all the universities arrange various types of entrance examinations. There are almost the same number of men and woman reaching their doctoral educations. [37] This denotes that everyone has the same possibilities to study. Finnish students do not pay tuitions for their studies. In this light no one does not need to skip one's studies because of their financial situation. The school system is supported by the Finnish government.

The Finnish school system in years is shown in Figure 3. In Finnish school system

most of the pupils in elementary schools start to study English as their first foreign language. About 30% of them are learning also German or French, but voluntarily. Finnish and Swedish, the official languages in Finland, are both in use in a small area and not spoken widely outside of the country. [37] Finnish students are usually familiar with at least three languages when starting their studies in a university. This offers a beneficial base for international studies.

During the near past Finland has become more international, when more people with numerous backgrounds have moved in. Nowadays this increased multicultural population has an affect on the development of curricula. [37] It has refreshed the method of teaching and thinking. Students can regard international environment as a natural part of their lives prior to graduation.

In Estonia, children under 7 years old can join kindergarten but no school type of teaching is offered there. After that, children are offered a 9-grade primary education and lower secondary education system. Upper secondary education for the people targeting a university degree is called a gymnasium. After that phase, students can begin their university level studies. The Finnish system does form a difference only in pre-primary education giving one year for preschools in a kindergarten or in a school. [37] The system is shown year by year in Figure 4.

Age of students

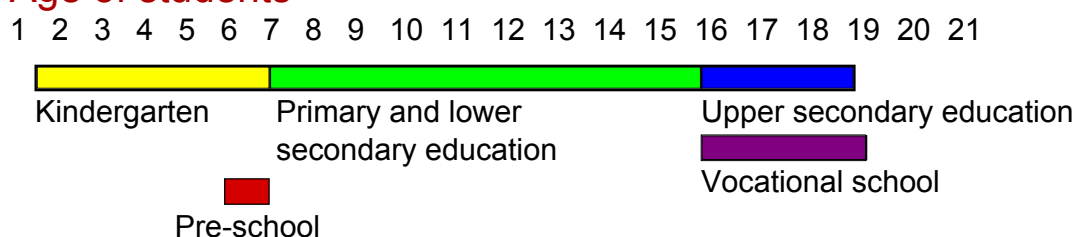


Figure 3: Education system in Finland before university level studies [28].

Age of students

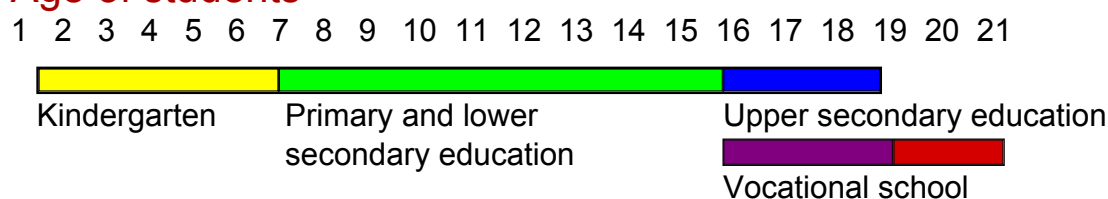


Figure 4: Education system in Estonia before university level studies [28].

There are several principles guiding the Estonian education system. First of all, the state ensures that everyone has an opportunity to finish the compulsory education, defined by law. The education is guaranteed in Estonian language in all levels. If the education is organized in another language, the instruction has to be provided also in Estonian. Economic management and pedagogical control have to be kept separate. [37]

The Estonian Ministry of Education was established again when getting the independence again in 1990. Currently there are free and charged degrees in higher education. Tuition-free places are provided by state. Tuition-fees varies between the institutions. Some fees are term-based but some related to the amount of credit taken in the university. After having become a member state in European Union, EU, Estonia has received more international students, but also allowed their native students to study abroad. [37]

After the independence there has been a remarkable rapid growth in the number of tuition-fee paying students. The number of such students have been growing both by number and by percentage. [68] Right after the independence in 1990 most of the students were publicly funded but now about half of the students are paying a small tuition-fee. About 20 years ago less than 10% of students were more than 30 years old but now there are about 20% of them. Most of those students are paying for their studies. [74] About 40% of students in Estonia are working and studying [6].

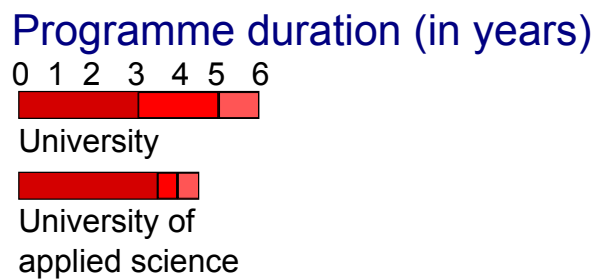


Figure 5: Higher education system in Finland [28].

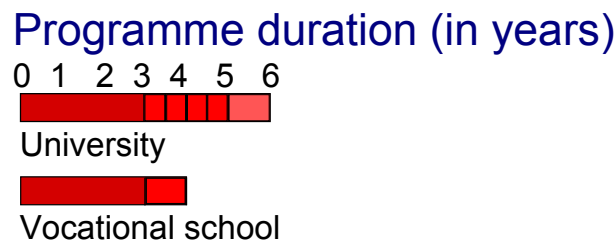


Figure 6: Higher education system in Estonia [28].

Both Finnish and Estonian higher education durations are presented in Figures 5 and 6. According to what is presented earlier and also shown in figures, we can assume that Finnish and Estonian students have very similar backgrounds and have equal high quality education systems. When regarding this research topic, same type of data collection should be completed in Finland to compare the results. However, the main target was to get information from Estonian university system and in a suitable case apply the achieved information in Aalto University. Furthermore, limited time and research resources intimidated to realize the data collection only in one place.

3 Research Questions

The first research question concerns how the university and faculty could support students to gain sufficiently ECTS per year. In this case I did not suppose yet that enough ECTS equals 55 credits. The second research question discusses about the study motivation and personal interest in studying compared to teaching methods. The third question concentrates on language effects on studies when lectures and assignments are not organized in students' first language.

1. How the Estonian university and course faculty support students in gaining sufficiently ECTS per year?
2. What type of effects teaching methods have on students' study motivation and what type of learning methods students prefer?
3. Does the English language have any effect on students' willingness and possibility to learn?

There were unofficial discussions in coffee tables that in Tallinn Technical University most of the students did not have problems to gain 60 ECTS or more per one academic year. Because students were active, it was easy to interview some of them and find out how the students see the beneficial and unsatisfactory sides of their studies.

The first and second research questions are wide and open several paths but in this study I have focused on the benefits in course developing in Aalto University and motivational aspect in general. There should not be one simple solution and the target is more to scan the strongest effects in the positive and negative purposes. I also expected that not all of these objects are in university's hands and the faculty in a university cannot effect on all of them. Especially the first research question focuses on what type of support and facilities a university could offer. This research question could have covered a much wider range of students and their study habits and concentrated more on an individual teacher's work on course level. The main focus of this work was mainly to find some of the most common problems and the best studying techniques from student point of view.

The third research question was added because the interviewed students were studying in a degree program where some courses are taught in English. That is why I wanted to add the language issues as a part of the research. I wanted to exclude the possibility that students' motivation and progress do not meet the ECTS requirements because of the language. It is possible that the language may effect when studying in a foreign language.

4 Research Methodologies and Data Collection

4.1 Research Methodology

Conversations are a natural mode of human interaction. People talk and interact, ask questions and answers them. We meet other people by interaction. There are several forms to have a conversation. In everyday life people do small talk. A research interview is a professional conversation but is based on the daily life conversations. The structure of the research interviews is similar to daily conversations but is has a specific approach and technique of questions as a professional tool. This method seeks to interpret the purpose of the most relevant themes of the subject. The interviewer cannot only ask questions but has also to expound the meaning of what is said and how it is said. [41] The interviewer has to sort the answers and read the meanings to compare the results. The person who interviews causes typically an effect on the interviewee and the result may vary somewhat depending on the interacting people.

This research consists of qualitative interviews only. Qualitative methods are not only softer methods added to the hard-core quantitative research [41]. The collected data is not quantified and has meaningful and constructive relations. The qualitative research has frequently been accused having lack of objectivity because of the human interactivity. Earlier several researchers have declared the superiority of quantitative research [14][39][53]. However, quality refers to what type of concept it is and and the purpose of it compared to quantity which describes only how much there is something [41][79].

In modern education research quality and quantity are two independent issues and has different kinds of forms and knowledge. The term is used in incompatible approaches to do research. [43] However, qualitative and quantitative methods cannot be hold totally separately. A quantitative researcher gathers a quantitative aspect at the same time. As shown in Figure 7, data source can consist of response data to test questions, interview transcriptions or even videotapes. The interpretation model can be composed of scoring rules, coding protocols and filters. The resulting data can be comprised of scores on test questions and types and numbers of expressions or events. [27]

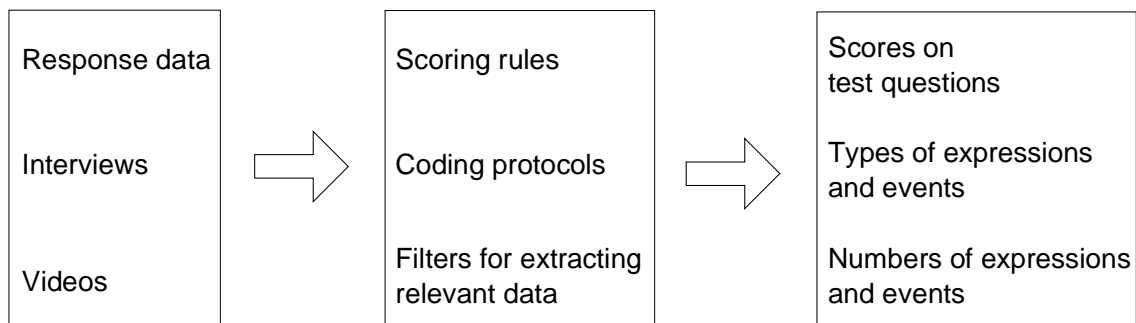


Figure 7: The process of constructing data. [27].

The qualitative interview has a diverse of qualities and meanings and the inter-

view can examine the effect on social side [33]. Interviews and specially qualitative interviews can offer a value and method for understanding data, opinions, attitudes, feelings and what people have in common [3].

In this case qualitative interview method was chosen because it provides deeper knowledge about chosen research questions than a quantitative method could offer. Interviews can enable wider answers and offer explanations and solutions better than quantitative data. The research questions introduced in the Section 3 are academic and are translated into easily understandable questions in interviews.

The questions in the interviews were formed to help to collect data about the research questions. Each interview question can be refereed thematically with regard to its importance and purpose according to the research questions. The later structuring of the interview wanted to keep as simple as possible and because of that the questions were semi-structured. [41] Structured and semi-structured interviews offer typically a tradition where the data is used as a resource and when the assumption is that the data consists of the knowledge and experience of the interviewees [71].

Basic rules for qualitative interviews are simple and lead to higher quality results [16]. It is important to note some details before starting. Formulating the questions and reacting in a right way during an interview helps both interviewer and interviewee.

1. Do not expect interviewees to be able to directly address your research question. To get a wanted result, formulate your questions to be more human friendly.
2. Avoid questions that can be answered with 'yes' or 'no'.
3. Avoid biasing responses, for example by sharing your hypotheses.
4. Follow-up questions should be used to encourage expansion of ideas concerning the most relevant to the research question.
5. Probes are standardized ways to get more depth and details.
6. You should also be prepared to reform questions.
7. It may be helpful to summarize key ideas and themes back to the interviewee to ensure you have a proper understanding of their meaning. [16]

All the students had the same questions in the interview and the questions were asked in the same order. The questions were mostly semi-structured and there was not right or wrong answers. In some cases the interviewer asked a student to define or explain the answer more detailed if the answer was too simple, for example 'yes' or 'no' type, or if the student did not state any reasons for his strong opinions. The students were allowed not to answer to a question if they felt that they did not have any opinion or the question did not affect them. Only few students used this option.

At the beginning of the interview some details about student's background were collected. The age, nationality, native language, study years in a university, a degree

program and the main reason why a student has chosen that particular university were asked. The data was used only to form a view of the sample group of the students. However, it would be important to know if some students would not follow the normal study program or someone has a special background or something else that would effect on the results. According to the sample group also some speculations can be generated.

The first research question about support for students from the Estonian university and faculty and its effect on the level of achieved ECTS was connected to several questions in the interviews. The main focus was on the concept of ECTS and the actualization of it in studies in TUT. According to the guidelines one ECTS equals 26 hours of student's work in TUT. The students were asked to estimate if they use a lot more or less time per one ECTS in their studies. The hidden purpose of the questions was also to achieve information how much students do pay attention on the time they use per course or per ECTS and if they do know about the system which defines the European equality of study requirements. Further, the students were asked to calculate the number of ECTS they gain on average per one semester or per academic year. The idea behind the second question was not to compare the time and effort used in studies compared to the results but to find the normal level of ECTS and a feeling of load or stress of the studies.

Regarding to the second research question also a direct question about received support from university and faculty were asked. Students were asked to specify also their normal study habits and if they do study alone or in a group and also to think about other sources of support they may use. A question about the main problems in their studies was a part of this research question. Both study habits and problems were chosen because they can offer information from the university and provide some tips what the faculty could take care of better in the future. Furthermore, students may use support from other sources and a university could benefit the information in a case of contradictory source of knowledge.

To avoid the problem of getting irrelevant criticism only, two questions about student's own activity and a vision of a good teacher were asked. The target was to find information about required support and also to find reasons why a student may need more support or try to avoid support.

The second research questions about the teaching methods and the type of effects they can have on motivation had various questions in the interviews. The research question and its reasons were divided into various parts to help the students to focus on a variety of smaller details instead of a simple and not describing solution. The students had to think about their interest in their studies. They were asked to think if there is something they would like to leave away from their degree or if they would like to add something that does not exist yet or has a small amount of weight in the degree.

The straightforward question about the main reasons of a motivation and not motivating courses were asked. The students also had to describe a situation in a course context when they may loose their motivation. They need to think their own reasons why they are studying and when the studies are struggling. There was an expectation that student may not mention evaluation or assessment and a question

about the effect of the course assessment were added to the list. The assessment varies a lot in courses depending on the teaching style and the target was to hear if the students want mostly to exclude the final exam or to study actively during a course. The question was left open because there is no need to create a bias and lead students to a wanted answer. Onwards, the students were asked to think if there is a difference in motivation if the exercises or laboratory assignment are mandatory or voluntary. This question was added because the students participated in the course where all the assignments had mandatory sections and there was an expectation of a possibility of a slight overload.

Students were asked to mention the teaching and learning methods they prefer. In the first stage no learning method was mentioned to avoid having a bias in the answer. If a student could not mention any method or did not understand the question, a list of methods were offered for help. Some students needed the list. Compared to the learning methods, also comfortable issues in a course were asked. The students were asked to describe the best course in their studies to get an idea of the relevance of their answers in earlier questions about the learning methods.

The last research question about language effects on studies had four evaluating questions in the interviews. First the students were asked to evaluate their own English skills and to describe if it is harder to study in a foreign language. The first question measures both their language skills and the level of self-confident. It is possible that a shy student who does not use English much can underestimate his own skills. Because all the interviews were in English, the interviewee herself could also estimate the skills and by using this method also form an opinion of the level of language skills and self-confident. Furthermore, students were asked to estimate the amount of courses taught in English in their degree program and to think if there is a difference if a teacher's native language language is Estonian or something else concerning the effects on the learning when studying in English. The two questions formulated a view of student's feeling of his studies in a foreign language. If a student has many courses in English and see the difference between teachers with various native languages, it may help a university to guide teachers to think more their use of language. Limiting the categories of opinions students were asked to describe also their foreign language use in free time and their willingness to study abroad. The questions were asked to achieve more information how students feel the effect of the English language in their life. The use of a foreign language in free time shows the willingness of use the language when needed but not required. The interest to study abroad implies more their willingness to do something new and courage to step to the discomfort zone. It does not automatically lead to studies in English because many students have other language skills and could study also in Spanish, French or German if studying abroad.

4.2 Sample Group

In this research project 18 students in TUT were interviewed in a face-to-face interview. The questions can be found in Appendix A. The students represented five separate nationalities and four native languages as shown in Tables 1 and 2. Two of

the students were not living permanently in Estonia.

Table 1: The nationalities of interviewees.

Nationality (n=18)	
Estonian	13
Russian	2
Ukrainian	1
Polish	1
German	1

Table 2: The native languages of interviewees.

Native language (n=18)	
Estonian	13
Russian	3
Polish	1
German	1

On average, the interviewees were 21 years old and had studied 2.3 years in a university as shown in Tables 3 and 4. In Table 5 is shown that most of the students were men and only four of them were women. This group of students describes very well a normal second year class in electrical engineering.

Table 3: The age distribution of interviewees.

Age (n=18)	
20 years	8
21 years	7
23 years	2
26 years	1

Table 4: The study time distribution of interviewees.

Study time (n=18)	
2 years	16
3 years	1
6 years	1

Table 5: The gender distribution of interviewees.

Gender (n=18)	
Female	4
Male	14

The expect of success in studies in TUT was correct. The average amount of ECTS per semester among interviewed students was 29.78. More detailed distribution of ECTS is presented in Table 6. The students in this random sample group have achieved more ECTS than the average value in Electrical Engineering degree program, EST, in Aalto university is. In EST program in Aalto the average value is about 24 ECTS, when all those students who do not get more than 2 ECTS have been removed from the data.

Table 6: The distribution of average number of ECTS achieved per one semester.

Amount of ECTS	Amount of students
<25	1
25-29	4
30-34	12
>34	1

Table 7: The international study willingness distribution of interviewees.

Gender (n=18)	Interested in	Not interested in
Female	3	1
Male	12	2

All European countries are individually developing and creating their higher education systems. There is no rule how these 3, 5 or 8 years taking bachelor,

master or doctoral programs are organized. One trend can be seen over many of the countries and most of the programs: trans-national education. The main forces to help this process have been the adoption of an ECTS-compatible credit accumulation system. The adoption of a common but flexible frame of reference for qualifications, compatible quality assurance system and empowering Europeans to use new learning opportunities. [34] This is very likely the main reason for students to enter to study abroad. Because this study was completed in a degree program where students have some courses taught in English at bachelor level as well, some statistics about students' language skills were collected too. Regarding to Table 7, 15 students out of 18 showed willingness to study abroad, as an exchange student or a degree student in the future. Only some student were not interested in to move abroad for a while. Some students had already some international experience when studying in a foreign university or working abroad over the summer season.

5 The Student Point of View

5.1 Interviews

Students' opinions were asked with many questions and their solutions differ from each others, as expected. There are still some clear structures that most of the students would appreciate. Some problems were mentioned in many interviews but there were also totally opposite procedures of thinking. Some students had many more detailed sight in their studies and some others were just happy to study.

5.2 Teachers and Teaching Methods

University students and their styles of learning do not all typically fit in the planned forms in a course [47]. First year students may be adjusted quite easily in one form but sooner or later students will find their own best techniques to learn and study. It is occasionally possible that a teacher does not know how to teach. One problem in learning and teaching processes in universities is that teachers are thrown in a new course and they may not know much about the learning process itself [80]. Students can see and feel if a teacher is a suitable for his position and also if a teacher is interested in the topic and the teaching itself and also has a certain level of knowledge about the topic. The following quotations from the interviews describe how students think about teachers.

"(The teacher should be) someone who tries to make lectures more interesting."
(Male, 21 years)

"Maybe when teacher is always ready to help you and a lot of consultations, where we can come and ask some questions... If I don't like the teacher. He or she, like, hard to say... Motivated, helpful, I don't know... Active... I have not met too active teachers, I can say... I think that I would like to have, like, more motivated teachers because some teachers, like, just give their lectures so slowly. They are not interested in their subject. They just give lectures and go away. But, if a teacher, like, says... He is really motivated to help students and it's really cool." (Male, 20 years)

"Teacher was... Teacher explained us everything so everyone understood what he did and so on... I think good teacher should be friendly. He or she has to explain his subject very well. And, he has to speak with his students a lot, I think. So he knows what they know and what he should explain more or..." (Female, 20 years)

"I have to have a feeling that the lecturer is really interested in the course himself or herself as well. And he or she has to interact with the students, not just read some text or make some notes on the board. If the lecturer is interacting, then I feel comfortable. And if he or she really cares about whether the students understands."
(Male, 20 years)

"I loose motivation going to lectures when the person who gives the lecture speak very boringly. He himself isn't interested in ... just reading from paper or computer." (Male, 20 years)

Students mentioned attitude related items such as being cheerful and keeping communication on a level which the students need. Furthermore, the real willingness to help students, provide them with a new knowledge and the real enthusiasm to put them to follow a course are features which a student respects. The students have seen various styles and types of teachers and teaching methods. They can prove which method and style is the most functional in their case.

"The teacher must be cheerful, he shouldn't be so angry and ... if they take you as an equal ... he communicates normally and helps me ... when he answers me politely and suggest me what to do, then he is a good teacher." (Male, 20 years)

"I feel comfortable if the teacher is... If the first impression of the teacher is good. That he is easy to understand and listen to and doesn't make you to fall asleep in a class. Basically, that is a big plus. Also, the subject must be interesting, in such a way that you want to learn it. Not like, just memorizing rows and rows of text or... Or some equations." (Male, 21 years)

"I have seen many teachers and assistants during my years here. But, a good teacher is very helpful, willing to listen to a student where is a problem or what does he or she need help with and... And giving them solutions in their problems in their course, of course. Giving advise. " (Male, 21 years)

Sometimes the success and motivation is not in teacher's and student's hands. It is possible that the chemistry does not work or the persons are too different. Depending on the persons, it may be the only reason why a student loose his motivation. It may also be the main reason why a student is motivated.

"When there is a good teacher who makes it interesting." (Male, 21 years)

"The teacher has the most influence actually. Mainly the teacher, but the subject might be interesting enough..." (Male, 21 years)

For most of the teachers it is a matter-of-course to have a certain level of knowledge. Sometimes it is possible that a teacher has not known enough or has shown insecurity. If a student has noticed that a teacher is not up to date, it is probable that a teacher do not know enough or at least cannot express himself clearly enough.

"I think it's very important that he has a big knowledge of what he's talking about, and the passion and that he likes to teach that." (Male, 26 years)

"The most important thing is that he or she knows what he's talking about because

actually some teachers who don't know. They know but they can't teach that. And they should be strict." (Female, 20 years)

University teachers do not only spread knowledge and practical skills but their own opinions effect on their students. Teacher's own experiences in a university can also effect on the method of teaching. [73] Teacher's attitude and the approach how he talks to students and listen to them is in a fundamental role if students are not outstandingly interested in the course. Students also appreciate a respecting teacher, who does not conduct students to feel themselves stupid even if students do have very basic questions. Teachers should also be realistic and understand the level where the students really are. Students may feel very uncomfortable when a teacher only talks and talks without giving enough background information. It may be even impossible to ask any question, even the stupid ones, if a student cannot understand enough. Teachers are also required to help students equally that does not occur typically in a student point of view. In the interviews students described good teachers in the following words.

"I want to know that if I have any kind of questions, he or she will be able to answer them. Also, a respect to us, to students, because when a teacher is respecting me I have more respect to him... He is speaking specifically about the topic, he is not talking about... any other topics he wants to talk. He is taking about science, the topic he has to talk about. He helps students to improve themselves. If they want to know something about the topic, he recommends on some literature or some other activities to do." (Female, 20 years)

"Good assistant, maybe, the one who you can ask if the teacher is busy helping someone else, who you can ask and he can maybe help you out. He doesn't have to but he has something to say about your thing what you are doing... And teacher, I think good teacher is... Who explains. Explains hard things. He makes them look easier than they really are." (Male, 21 years)

"A good teacher communicates with the audience, asks questions, uses different materials, not only like text, but also, like, audio and video, as well, in the lecture. Then pretty much time planning as well, how he or she can use the time during the lecture, and can be equal attention with everybody, with all the students." (Male, 20 years)

"I don't like some subjects because the lecturer describes it like he thinks it is but he knows much more than us and he understands it but we don't get it, because he knows the background. Then I think, why are we studying this subject." (Male, 21 years)

The motivation comes occasionally from the teacher and what he or she requires. This quotation represent slightly different opinion than demonstrated earlier.

"I guess it's mostly the teachers that can make it comfortable but I think that a course shouldn't be comfortable, I think it should be harder. If it's comfortable, you go to the lecture, you go to the practise, you are going to sit there you are going to listen there, you feel comfortable but you don't study a lot. You don't remember a lot. I think it should be like, you should have tests in lectures, more tests, because if you don't have like, it could be a motivation like, a teacher should do more tests because it's the motivation. I like those courses where the teacher gives you an opportunity to do the course without examination. If you do all the tests on certain level. For me it's a really good motivation." (Male, 23 years)

Basic ideas cannot be clear if they are unknown. As a teacher, it is important not to expect that the student would know and especially remember every little detail that is presented in earlier courses. Teachers need to repeat the most important aspects as often as possible. It is a fact that a teacher knows and remembers a lot concerning on his own subject. Many of the obviousnesses are obviousnesses only to a teacher.

"I like when the teachers, like, teach basic things too, because many of the teachers assume that you have some kind of proficiency in some other fields but when you don't and he just skip over it, it's very hard to keep track. So, I really like when teachers are thorough and teach better material and make sure that everything is understood. That's the most important thing." (Male, 21 years)

Positive thinking and polite students exist but when something goes wrong, a teacher and his behaviour can also kill the motivation very quickly as some students highlighted in the interviews.

"Last semester I had incidents because I was studying this same exact area in another university. Then I came to here and we had a course... We didn't have any opportunity to learn this course in "another university" but they did in here. We had, but it was one month... But they has a whole half year like doing works and laboratories and we don't... And the teacher, when we came here, was like oh you don't know anything and why should I even teach you..." (Male, 21 years)

"When the teachers are very boring. It seems that they don't want to give that lecture." (Male, 20 years)

"When I see that we only, just learn something from the books. We don't do anything practical. This is, oh no... Then I lost my motivation." (Female, 23 years)

"When there is too much lectures, and no practical, this is not my cup of tea." (Male, 21 years)

There are also some very flexible students who appreciate the method a teacher has decided to use as shown in the following quotation.

"I think everything has its place like old school teaching but also some newer stuff should be mixed in like computer or something, videos. Video materials are pretty good, I think... But also old fashion books and such stuff. Well, I guess both (teaching ways) have their advantages and I don't dislike either of them. I like them, like, I like all of them equally, I think. There is no much difference to me. How we get graded, like, by examination or how ever." (Male, 21 years)

The situations in a real classroom should be more real life related [17]. It denotes that possible studying styles should also vary and not be only so called traditional methods. In this case the point is that the students may not be ready to work in a real working place. Many graduated have problems to move from university life to working life and work with real situations which are not as clear or simple as the examples in a university [2]. Real life related examples may produce more clear problems or keep the motivation higher. This concerns again around the already mentioned thought where the teacher knows almost everything about his subject and can easily see relations between specific topics. The students do not have this option and examples are very useful. The following comments in the interviews represent the fact that various students share this opinion.

"I like when teachers bring real examples from real life and try to make something that seems difficult in theory in real life situation." (Male, 20 years)

"A course is motivating when you can relate those studies or exercises or examples with real life. Because what is lacking in universities are practical abilities or that kind of like... So if you can relate to real life stuff and you can see that you can use them in every day life, it's easier to be motivated. You can see all, I can see this, I can do that..." (Male, 21 years)

"I guess teachers should little bit sell more idea of the education, idea this course as well. I mean, like, in lectures we study a lot about the theory, and practise as well, we do the practise but actually we don't have a big picture how to integrate the theory or thing that we learn in real life. Because the teacher should give more examples about like real life where we can use it. I guess it's a way to get more motivated and if a teacher doesn't do it... And I'm studying those things and I'm thinking like... Where the #### I can use this!" (Male, 23 years)

"If I know that I'm not going to use this particular course in my entire career or I don't see such opportunities now, I don't feel like studying those subjects. Also, when I see that the teacher is not requiring anything, I mean, if I can get the highest grade with very low effort, I'm not trying at all to do something more." (Female, 20 years)

Depending on the subject, everything is not possible to present in a classroom. Examples in a real life related situations can be as easy as visits to places where the idea, theory or function is in use. A factory or a company in a specific field can be

the first touch with the real life learning in a student's career.

"Some courses have, like a part of course, excursions, to other places, like factory. Last semester we went to a factory, to the power station, and here we could see the, all the generators that do huge things and work. So it was really interesting. And motivating." (Male, 20 years)

Another approach is that students are coming from specific type of schools and they can have various types of backgrounds. It indicates that they also can have a variety of approaches to learning [59][77].

In Kolb's learning categories students are divided into four groups. In these four groups students are learning the best by feeling, watching, thinking or doing. There are also some differences between men and women. Kolb has shown that students need more doing and thinking than just watching or feeling. The results of his research among the students who studied science are shown in Table 8.

Table 8: Kolb's learning styles when teaching science [40].

	n	% Feeling	% Watching	% Thinking	% Doing
Female students	76	5	26	18	50
Male students	58	0	17	38	45

Depending on the category a student can feel himself more or less comfortable in a course. Active methods and continuous assessment seem to be popular according to the following comments.

"I feel comfortable when a course is logically built up so that first we learn something and then we use it in practise or do exercises on it. But sometimes it's like we have the exercise before the lecture so we first do the exercise and then we are told what we were supposed to do and I don't like that." (Male, 21 years)

"I prefer the active methods, when you study in the course." (Male, 21 years)

"I think... I like the active learning when I get constant feedback when you I constantly, and motivates me to work constantly." (Male, 26 years)

"I prefer the small tests every week. It's better. " (Male, 20 years)

"I think a test every week, it little bit more motivates me to study because you need to study every day. You just need to because you don't have any other possibility to have, not good but some mark. So I think it's better." (Male, 20 years)

Active learning and teaching methods in a course has to be thought wisely. New methods should offer better learning possibilities to both strong and weaker students

[7]. At teacher's point of view not all the students can benefit. The observations about lecture attendance percentage in TUT show that on the first lecture almost all the students start actively [66]. The same result has been noticed also in Aalto University.

Assessment as an integrated part of a course and learning in a course can stimulate students to adopt a deep learning approach. It conducts students to search actively the purpose and connections and encourage them to appreciate more the assigned tasks. [31]

Assessment can have more purpose in student's learning than anything else. It influences what and how they study. [13] Students know that they are getting lazy if nothing is required. If they are allowed to hang around during the semester, they frequently do it. If there is some work every week, they do not complain. In that approach assessment at the end of the course kind of leads student to be free and not to study during the semester. The following quotations show that even students appreciate more work compared to laziness.

"If there is only an exam at the end, I spend more time then at the end of the semester to learn to the exam. If there is something like once in a week, then my studies are more regular. I think I'm getting more prepared with everything because I have to do it every week. So it's not that I'm sitting, learning, passing and forgetting everything." (Female, 20 years)

"If there's a test every week, then I have to study every week. It's good because you learn step by step. Then, after the course remember almost everything... If there are only one exam then we start to learn a week before the exam..." (Male, 21 years)

"If there is a test every week, it's better, because you are learning all the time, not taking any week breaks when you don't read or do anything with the subject, so forget something you have learnt." (Male, 21 years)

There is also the other side of the coin. Some students continue with active learning to the end of the semester and some students do not. The requirements how much they have to work during the semester seem to be the main reason why some students quit and take an exam instead. If a student cannot study actively during the semester, the grade will be poor. [66]

Higher education in Estonia concentrates on two types of training in engineering field. They have application-oriented engineer who are capable to use new technology but also research and development-oriented engineers who are able to create new technologies. This system is corresponding with the system in Scandinavia and is the most relevant for minute countries such as Estonia. [34] There is only one completely technical university in Estonia. Only in Tallinn University of Technology students can study engineering subjects. Tartu University offers related topic as physics but is not a technical university. In a university where students are having more theoretical studies, a combinations of theory and practise are highly appreciated. Not only active learning but practical assignments together with theoretical

parts are helping students. It may help if a white board is in use compared to lecture slides, as shown in Figure 8. Several students highlighted practical studies in the interviews as presented here.

"Theory with practical experiments. Then you can see what's happening and compare it to... Then you can compare practical experiments with theoretical. That's easier to understand what's happening." (Male, 21 years)

"I like to do quizzes in lectures, and after that to do a practical lessons. Not only theoretical understanding but also to see how it works in practise." (Male, 20 years)

"I prefer writing on the board... Maybe more practical. Or if you have a lecture and then you have a laboratory and you have exercises, it's really good because you can... In one you can do yourself, by yourself and in the other ones you can do exercises about this and in the lecture you, maybe not relax, but you can watch the theory and learn about the theory. And I think it's really nice to have that kind of teaching method. Like we have here in some courses." (Male, 21 years)

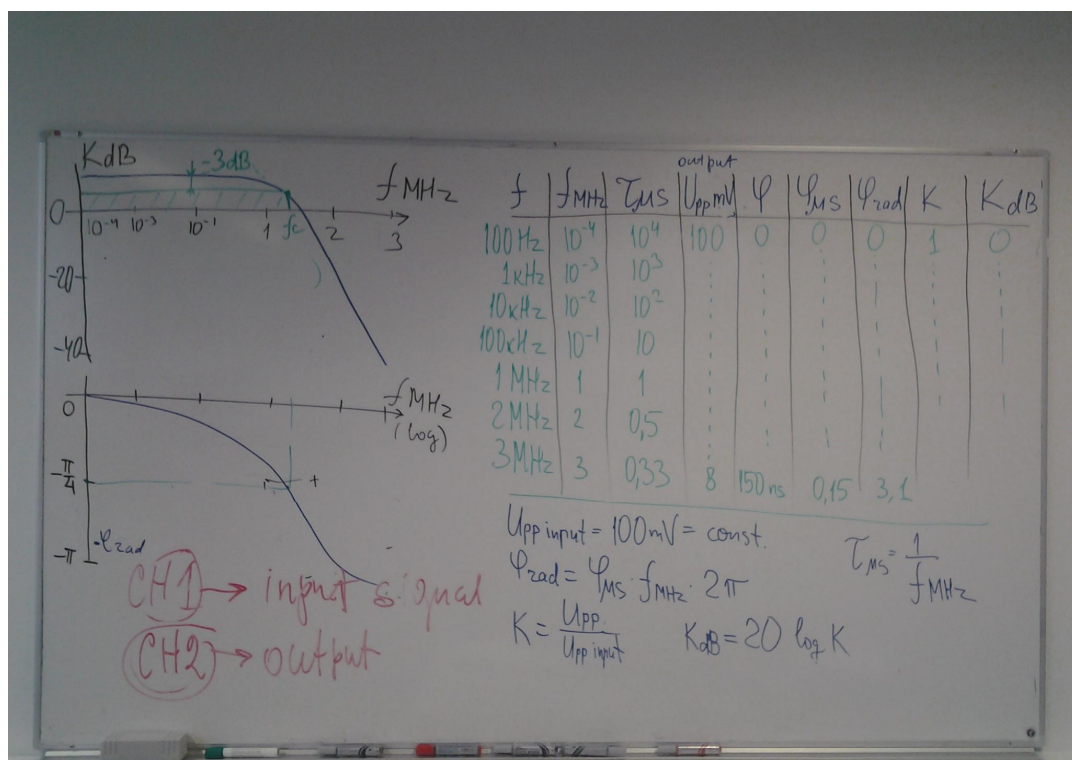


Figure 8: Some students prefer to have instruction on a white board.

Getting out of an exam is also an effective motivation. Then a student may have more time later for those courses which have an exam at the end of semester. It is important to note that not only actively shown knowledge or an exam is the only choice. It is highly appreciated to have an option to choose. If one way does

not work, you can typically have a backup plan. The students mentioned various benefits in active learning in the interviews as shown in the following comments.

"I like the system where we had, tests, we had two tests and like five or six homework. And if we did this all correctly we didn't have to go to exam. So tests, from time to time, I guess it's better than exams. Like one big exam... There should be, like we had, you can choose between the exam and the homework and tests. If you can't manage to do them, you can do the exam always." (Male, 20 years)

"In here we have many course where we can get our grades without an examination so where you can get those grades without an examination I of course do more because it means I have to work hard during the semester but after the semester I have fewer exams and more time to focus on them. It's easier during the end." (Male, 21 years)

"Active learning is a very good thing. Because, when you... We got some courses where we only have an examination in the end of the course, but there's nothing, like, during the course. Nobody even check if you are there or not, like, in a lecture or where ever. And there just like an examination and then usually we don't study that hard. Or in other subject, then there in lectures, we have these quizzes and, like, very many things and then you like study, study. It's quote much motivation. And its a really good thing when you could have an opportunity to get a grade, like examination grade, before doing an exam if you are very good during the course. Then you can have your grade without doing the examination." (Female, 20 years)

"Motivating, it's more, if you, like, have in semester... You can do workouts. It will make your grade and then you don't have to do the exam, like, if you have caught many small tests in the middle of semester. And if you do it with appropriate results, you can pass. You don't have to go to the exams. This one motivates me more. And... Also very interesting courses." (Male, 21 years)

The higher education has to be multi-level and not unbalanced. It should have theoretical side but creative side as well. [34] Laboratory assignments are in an important role in a novel course in electronics. [65] As it can be seen, active learning is very highly appreciated among the students. On the other hand, the active learning should really be active and more student oriented. Some students would like to be more creative and not only follow the framed rules. They also need more time than teachers can imagine if real learning should occur as the next quotations indicate.

"I like practical subjects. But, the laboratory works are in strong rules. We can't do it by our own thoughts... It isn't so... And when we do it in our own, then someone teaches how to do it better. Or something like that." (Male, 21 years)

"We should definitely have more practical things. We had that but it's not enough, I think. Because we go very quickly, quickly, quickly. You do something but actually,

you, like, you don't have time to think what are you doing and why.” (Female, 20 years)

Practical assignments support the real-life situation based learning. Students do appreciate real life connections even if they can be done only with a computer as students in Figure 9 are simulating.



Figure 9: Some students (not related to the interviews) in a computer laboratory in TUT.

Some students are also more social than others. It does not matter if one is a social or unsocial, he has to learn some team work skills to become an engineer. In this case studying alone all the time is not the best choice.

Small-group working can offer much more and not only the understanding of the substance. It can help students to develop their interpersonal and collegial interactions. Working in a small-group denotes teamwork, practical problem-solving, decision-making skills, presenting skills and so much more. [42] Students entering university are more team-orientated today than ever before [36] [20]. One negative effect on today's universities is that they are old fashioned and have mostly larger lecture halls. Those halls do not support small-group teaching and teamwork. If logistics in class rooms are not working correctly, teachers may think it as an excuse not to use small-group work [18]. If there is not possibility to have group work in a university, it could be appropriate to encourage students to do it in their free time when they are studying outside of the lecture halls. Some students do like, some do

not. The reasons why someone prefer to study alone or in a group can vary greatly. The students described the situation with various comments in the interviews.

"Alone. I'm really not a big fan on a group work. I mean, we can do group work but... If I'm in a group and it's my decision, I kind of divide the work so it's going to individual work anyway... Maybe it's because of the way our practise and lab works here are.... Because it's usually, one, one or two are doing this and others are just standing around." (Male, 23 years)

"I like laboratories but I don't like working in a group so it's like I like them but I prefer not to have them. I'm more like into individual work. If I can't do something on my own, then I can ask but sometimes... sometimes people are just destructing what I'm doing." (Female, 20 years)

"If I have a good team I enjoy to study in a group... I like to work with people who also want to get good marks. And put some effort to it. If they are people I'm familiar with, I like to study with them. If not, I prefer to study alone." (Male, 26 years)

"I usually do it alone, because, I don't know. Sometimes I would do it with a team but in more cases I am doing it alone." (Male, 21 years)

"Mostly I've done, if there are exercises, individual exercises, I usually do them alone. Like, there are a lot of group exercises, I will do in pair and groups." (Male, 21 years)

In these cases it is important to remember that working in a group does not automatically indicate collaborative learning. Collaborative learning is an educational method. In this method students work in small groups and define and reflect usually real life problems. In such a learning groups are more guided and need more teacher's advice in the beginning. [52][70]

It is not only about the small-groups but also groups when students can have better connection with the teacher and the teacher can share the passion of science. According to the interviews students appreciate team work when they can clearly benefit on it.

"I like courses where we have small groups and where we have lot of interaction with the teacher or the professor and where you can discuss about things. I also like to do practical stuff. And what I really like it is when the professor has a passion on the subject." (Male, 26 years)

"It depends on the course itself and the homework. When we have kind of big materials or big homework I tent to study in a group because it's easier to be motivated, easier to take bigger materials at once. Work them through with others. And it's easier to memorise things." (Male, 20 years)

Some students would prefer more team work but it may not always be possible, as the following quotations from the interviews tell.

"Usually I study in a group. I don't like to study alone." (Male, 20 years)

"Usually, I don't know, it depends, sometimes I do things alone, sometimes we do in a group. Especially, like, in some courses we have, like, practical exercises and we are in groups so then we do together. But sometimes even if we, like, don't need to do them together, we just like, sometimes my course mates like come to visit me and do together. Together, it's good." (Female, 20 years)

"50-50. We did all laboratory works here in a library together. But, alone, only in Moodle." (Male, 20 years)

In this case attention funnels to that team work divides students into two groups. Working in a group seem to generate surprisingly strong opinions. As an engineer the teacher knows how important team work skills and communications with other members of a team are. In this light it should be obvious that the teacher would include some team or pair work in his course. Anyhow, voluntariness also in this case may benefit both team work and not team work type of students.

5.3 Workload

Students are basically interested in their studies or otherwise they would not even apply to get in a university. It has been shown that when students are having too heavy workloads, their interest in learning decreases [50]. The definition of an ECTS is not typically clear to all students but students still know if a course has overload. They also confirm that the workload varies in different courses. When one course has more work to do and another has less, they can still keep them in balance. Some cases are more extreme and may cause problems. The next comments from interviews shows that students have not thought much the workload or it has no rules.

"Last year there was a course and I think I spent 30 hours per week and every evening when I came home I started to study." (Male, 21 years)

"Last year we had a course that took a big part, a lot more hours than it supposed to but others take a bit less." (Male, 21 years)

"I think that, like some courses, the relation, or how it is called, that's not like, it should be different. Yes, because some courses we had like 3 ECTS and then we do more than in a course where we have 5 ECTS. They should watch over this." (Female, 20 years)

As shown above, a teacher's point of view can be in a harmony with the content and workload but the students, who are doing the actual work, can feel very differ-

ently. We also need to remember that some students need more time than others. However, it is alarming if many of the students in a group mention one single course which is taking significant amount of their time. As a teacher, it is important to remember that what we are expecting and demanding from our students, is away from their contribution to the other courses.

"Professors shouldn't try to give us too much homework. Because, at one point it is good if there is something to do all the time but right now I am in a situation where I have three subjects and there are 15 practical works and it means one practical work with measurements , data calculation etc. every week. It takes all the time." (Male, 21 years)

"Some subjects are simple and some harder. I believe that I usually use maybe less time. Because I usually don't study at home. When I have some homework I study at home but I usually study at school in the lectures and in the library." (Male, 20 years)

"I think I use less. Except for one. I think that is the only subject that has taken more time than the hours are.. The hours are meant." (Male, 21 years)

There is also the other truth of time management. Some students do not spend too much time, at least from their point of view, with their studies. And they would like to get even more to do. When asking do they really use 26 or 27 hours per one credit, they start to laugh. Part of the students mentioned much lower workload in the interviews as the following quotations show.

"Less, less! There is only like couple of courses where I really use, put time on the credits... I prefer teachers who give more things to do, more homework for example, more tests." (Male, 23 years)

"Rather less. I don't know, maybe a quarter less is required because mostly expect of those hours in the university, I study maybe... one hour per week so something. Of course this number of hours is growing with exam terms. But usually it's lower." (Female, 20 years)

"It depends on the subject... Last semester I used less time." (Male, 21 years)

"I think less time. Not more. Maybe less time, yes." (Female, 23 years)

"I think less, yes, less time. Because if I think 26, yes, less. Approximately 15, it's like 10 less. It depends on lectures, of course. But if the lecture is not so hard, then you can manage." (Male, 21 years)

As a student it may be difficult to estimate the required time when you have several courses at the same time. This may be a sign to the faculty. They could

inform students more and explain what is expected and how much time is estimated to need in one course per week. Time is limited both in students' and teachers' side. Awareness of the requirements could help both sides. Time management will be a remarkable part of most of the students' working life and practising it during their studies could help them later. The most important thing in this case is to inform students and prepare them to think and schedule their studies beforehand. Of course, if they do not struggle in their studies at all, there should not be any problem.

"It's quite hard to say because the semester work is spread through the semester but I would say less because I'm not that kind of person who works, like does everything with a max. I wouldn't say I do everything with a maximum effort. Because, I don't see the point... Because I get the same degree as the others... I usually use, the medium effort, how to say... But it depends because some courses that I like more, there I do more. But those I don't like, there I just make it with the minimum or that much effort, a grade I want to get like a 3 or 4." (Male, 21 years)

"I didn't think about it. I don't know. I think I spend less time because my study depends on my mood and when I don't want to go to university, I just lay on my bed and I want to something to learn, I just open my Moodle and, this e-learning, e-studying, and read some text and materials there. And, some friends, my team mates, explain me how to do it. How to do some exercise or other things very... So, quicker than teachers do it in a lecture. Because, some of them just do it very very..." (Female, 20 years)

"I don't know. I haven't counted. I can't answer. I don't know, one course takes a lot of time but some other subjects, we just don't have homework. I spend much less time." (Male, 20 years)

Students may also be very pedant and working very severely compared to others. They may use more time than others but do not still feel that they do not have enough time. If they are only studying, there should be enough time to complete everything and spend 26 hours per credit. The coming comments from the interviews illuminate the situation.

"I'm not quite sure, I haven't thought about it so deeply. But I think it's pretty accurate or I use little less time. Little less or exactly the right amount." (Male, 21 years)

On the other hand, some students have to work and it is clearly impossible to study as much as it is required. Somehow they still survive and can pass the courses.

"I use less time because I do some work with my studies so I cannot be in all lectures." (Male, 20 years)

5.4 Personal Interests, Goals and Motivation

Some research results show that women prefer more coursework and are better to present their work while men favour exams [15][45]. It has also been shown that both genders success better when coursework is used as a part of the assessment [69][12]. Also evaluation is mentioned in many forms and if continuing evaluation is used in a course, it forces students to work all the time as the following comments from the interviews prove.

"That motivates a student far more than the exam." (Male, 21 years)

"I prefer a lot of small tests every week. So you have to, you know, study every week and, but when you have an exam, one exam at the end, so you can, like, 15 weeks, just do nothing and on the last week, oh, all, I have to study all the things. And it's really hard to, you know, to understand on the last week everything." (Male, 20 years)

"I think when we have small tests every week, it's better than a big exam at the end. Because, when it's exam, very many of students don't visit the lectures or exercises because they think that, oh it's a very long time for the exam and I don't want to go and these things, but when you have this small test every week, you have to come and learn and you learn more. Because, when it's exam it's usual that students learnt this subject last night... I prefer... I prefer when... When, when's a lot visual because, when I see something I remember it better. And, of course practise, practise is too very very important because when I need to do something with my hands it's better, yes. I don't, I don't like reading all the time. I like when teacher just explains with his words what is a meaning or shows what these things do or something like this. And, I don't like reading the books and this... Hard text." (Female, 20 years)

"I believe that the evaluation should be divided in a course because when there's no test no works in the course... most of the students, they leave this studying for the final week and they don't take part in the lectures. When the are quizzes... they will go to the lecture, they will listen, fill out the quiz and get the extra points. I think it's a good way." (Male, 20 years)

"When I can get the course mark within the course then I try to do as much as I can if it wouldn't be that I would do only mandatory parts." (Male, 21 years)

Continuous evaluation has been voted to be a brilliant idea as shown above. The interviewed students mentioned also motivation as a part of the learning process. Some of them described too difficult or poorly explained homework but also unbalanced learning methods. If a course has only lectures, it does not help if the teacher is using continuous evaluation. Versatile learning such as lectures, exercises, laboratory assignments, simulations, excursions and other methods combined in one course offer more to students.

"Loose of motivation... The case would be the homework and the subject is too, like, one-sided . It's like always calculations, it's pretty much like the structure is always the same. I mean, there should be some kind of, like, you can go to a power plant or implement these things. You can see how you can implement these things in business, for example." (Male, 20 years)

"I loose motivation when, for example, it's too hard homework and a teacher doesn't describe how to do it. It's very pity and very stressful. When you all the time want to find out how to do it and you don't know and... Yes, I'm stressed when it's happen in this type." (Female, 20 years)

Teaching practices are more than technical skills in a classroom and have dimensions such as moral as a part of it [56]. Items that are not subject related but are as a part of the course, such as evaluation, can force students to feel very unmotivated if teacher does not follow expected norms or is unfair. Evaluation has to be clear to gain students' respect. Misleading information in grading has caused some problems. It may be difficult to believe and trust in teachers and their sayings after that. The coming quotations from the interviews demonstrate some examples.

"He doesn't even bother to check the exams so he looks them, OK this is 2, this is 4, this in 1, like this. It's not fair. And if you go there to see what the mistakes are it turns up one grade better." (Male, 21 years)

Concerning on the teachers' power, it might be useful to them to think it and the trust that students deliver. When a teacher imagine that he has a good joke, it is useful to think twice before announcing it. A joke can lessen the load but if it is understood incorrectly, the result can lead to a deep problem.

"I have had some problems with teachers, like grading... Some of the teachers are just.. One teacher... We were starting to finish an examination, he was kind of joking but nobody understood. He said that the last girl just brought the test off... So all the boys that are bringing now are getting zeros or ones. But I was just writing my last exercise and just writing it on my note page so I just left it there and gave the examination in. Because of that I practically lost almost half of my points. After that he said that, oh it was a joke, but it was a bad joke because we had still 10 minutes left." (Male, 21 years)

Occasionally students are flexible and can accept the situation in any case. As a teacher it is still important to remember that there are always several types of students and the best learning strategies among a group may vary a lot.

"Every teacher grades differently so you just try to adapt to those exact teachers gradings. I don't know if it effects or not. I just try to be prepared." (Male, 21 years)

Among undergraduates many students start their studies with inspiration and hope to invent something new and change thing in the world but that diminish when time goes by [1]. It is pleasant to see the enthusiasm in the first year classes but also alarming to see students finding their studies maybe not boring but less remarkable in the larger scale. Without a clear target it can be dramatically more arduous to study. If a teacher can keep the suitable feeling of making and creating something new and important, a student may success better.

"It gave the feeling that I really can do something with my own head and my own hands." (Male, 21 years)

A personal interest is helping students to motivate themselves. Other students' level of motivation effect on too. Studying does not need to be something very special and it can be done just for yourself and your future. The following citations from the interviews represent the variety of the opinions.

"First the subject. I mean if it's something I feel I am good at or I'm really interested in, it's easier to me to learn and ask questions and understand. Second... Also, how a teacher is conducting the lecture, class, also important. If it's nice culture or not... Ans also, if my colleges are also into the course, I mean, whether they are listening, whether they are active or they are just sitting, doing nothing." (Female, 20 years)

"I always was impressed about electricity and came to study electrical engineering." (Male, 21 years)

"I think it's the best university in Estonia. And, I'm a technology mind, I don't like this art and other things. So I chose TUT." (Female, 20 years)

"The speciality seemed interesting and it's the only place where they teach this speciality. So that's basically why." (Male, 21 years)

"Because I like power electronics and so on and because it is the only place in Estonia where you can learn it." (Male, 21 years)

Autonomous studies fit if a student can understand that everything he does is for himself only. The teachers are not requiring anything because they want s student to do it but because they know that a student will learn and know enough when he studies it. If a student can motivate himself, not depending on how it happens, it is acceptable.

"I, of course, I try to do the optional things, if we have optional assignments... But, I try to do at least the mandatory things because then I can pass. I'm not trying to be a really smart person. I think I'm just trying to learn myself and for myself." (Male, 21 years)

If the topic is not interesting or a student do not feel that he will need that knowledge, motivation can be lost easily. This creates a dilemma. The teacher should always know why he teaches a topic and where the students will use the knowledge in the future. It is important to deliver this information to the students. This helps them to keep the study motivation higher.

"I like it if I learn like some usual knowledge. If I really learn something... What I really don't like is if a course is unproductive." (Male, 20 years)

Clear goals are important for students. If they do not know the goal, they cannot know when they have achieved it. Furthermore, if they do not know the connection between the new topic and their earlier or later studies, there can be a lack of something that generates the studying interesting and possible. The interviews describes the situation and its many dimensions in the citations.

"When you know you are going to need things." (Male, 21 years)

"When it doesn't have anything to do with what I'm learning ... my major." (Male, 21 years)

"Some courses just seem to be boring. I know they are necessary for the courses that come later but ... like math ... but I know they are necessary." (Male, 21 years)

"During the first days when you start the course it's always like.. Your head is... All over the place, you don't know what's going on but it always helps when teachers have uploaded or given us many different materials which to look for the tests or homework. I think if I have lots of material, I feel comfortable because I know somewhere there are explanations or examples for exercises. But, if we don't have much material, it's quite hard to work with it because your resources are so limited." (Male, 21 years)

"We had one course, and it's, I don't know, the teacher. He hasn't, like, his own plan. I think that a teacher should have like plan that I want to my students to, my students should know this one, this one, this one at the end of the course. In every lecture they have a plan what they will do. But this teacher, he's just like standing there and then there's like a two minutes totally quiet and he's just like watching to us. And we are like, OK, now what?" (Female, 20 years)

"If there is very little to do, I think, causes a loose of motivation for me. For example if I don't have a set goal for, let's say, every week. I will set it aside for a longer time so I don't actually read anything or do any exercise or anything with the subject, it makes me loose interest more like if I'm actively contacted with the subject." (Male, 21 years)

Occasionally people have goals that are created by someone else. Then the goal itself is more important to someone who is not working to gain it. Some students have chosen academic path only because of their parents. It is more difficult to meet challenges if the person is lacking purpose and value for his studies. [55] It is important to have at least some kind of own interest in what you are doing.

"I think that some of it came from my parents . They kind of guided me this way. And the other half, I think, was my own will to learn something more after the school." (Male, 21 years)

It is also beneficial to notice that everything is not under university's control. Some students can have personal problems and money is not the smallest stumbling block. A difficult financial situation may push a student to work more and study less, or hobbies and other time consuming activities, as the following quotations from the interviews imply.

"Financial support could be bigger." (Male, 21 years)

"Lack of money. Because I don't live in this city, I'm from other city and it's nice to go home for a while... but if the financial support... is like 87 euros so what can you do with 87 euros? Rent is 70 euros." (Male, 21 years)

"Time. I was studying a lot of more during my first and second year... I'm not studying so much. And why, because I have like a lot of things to do. I'm working... And if you are already working and studying, it's harder like put all the effort in, be in the schedule, do all the homework and the practise at the right time. I guess this is the biggest one." (Male, 23 years)

"It's lack of time, because it can be quite tricky to work in two different places and to go university at the same time. And sports, and all other things take time as well. If you are are, like, a full time student, only concentrating on your studies, then it's quite easy. If you are not working at the same time." (Male, 20 years)

5.5 Language and Culture

Occasionally students or teachers mention some problems for example in a communication and are blaming cultural differences. But what are the cultural differences and how the culture itself is defined? One approach to explain the term culture is to think what we are trying to reflect on something that we feel to be part of [29]. It is not an absolute reflection but transfers a view of the definition. The view is limited in our understanding. Culture is also a set of aims, symbols and values, and of course, norms that a group of people are sharing [58].

Culture is something that surrounds us all the time and we cannot separate our thinking out of it even if we try. That is why one cannot think one's own

culture objectively. [29] It should be clear that those people who are facing various cultures regularly and are talking with the people with a variety of backgrounds are easier accepting different styles and approaches of thinking. In the most extreme cases it is possible that a person cannot act normally with the other culture [29]. Such situations should not be typical in technical universities because the students studying in one university may have quite similar view for the life. A university itself has a kind of culture when students and faculty members are sharing the norms. The norms can still be a bit variable in different universities.

In some more extreme cases a student can feel very confused because the concepts of roles of female and male are different or do not make sense. In a more common case a role of supervisor or a teacher and a student can cause numerous understandings [29]. This is not a problem among natives in Finland or Estonia but can cause several types of situations when cultures are meeting each others.

More common cases are language problems. They are not that extreme but can still cause motivational problems. Many students who have advantageous enough skills in English still feel that they are not only studying a substance but also language in a course [44]. It may take time and effort from the main goal of the course. Some students may have problems to follow even in their own language and even more problems when studying in English [19]. Even if a student do not have problems with English, he can feel that it takes more time and effort to study in English or at least it differs from the studies in a native language as the coming citations describe.

"Yes, because we think in native language and it's a little bit harder when you have to think in English and study." (Male, 21 years)

"When I read something in my native language ... I don't read the all text, I look at it and see some pieces of information that are important to me. It doesn't take me so much time to understand." (Male, 21 years)

"I don't have to only to think about the topic but which words to use. It's more trying to put everything into words." (Male, 26 years)

"Actually, I only have one (course in English). Of course it's harder, I mean, specially in lectures, because in lectures a teacher usually speaks faster. It takes more time. If you can't understand like one word then you can't understand the whole sentence. So I think this is the most difficult thing in different language." (Male, 23 years)

"Well, sure it's a bit harder because there are some very specific words which I don't know the meaning of, so I have to look them up. But it's not too hard. It's just some little extra work and that's it." (Male, 21 years)

"It's definitely harder in a university because of all the technical terms. Some, you have to look up, because they are well-known and used very much." (Male, 21 years)

"Yes, a bit, because I understand this main idea but details, I have to translate it all the time and it's very hard." (Female, 20 years)

"That subject yes. Because it's hard even in Estonian. It's even harder to understand in English." (Male, 21 years)

Students may have various opinions and expectations and they can bring variety of perspectives and experiences to the classroom [73]. There may be problems but an appropriate teacher and active students might be able to turn them as advantages later. At least various opinions and previous experiences can offer a new start for fruitful discussions and students do not need to take all the information as provided by a higher stage. As a teacher it is important to remember that even if a student do not feel that it would be more difficult to study in English, it may be different and may take some time to get in to it. The interviews represented a variety of answers as shown in the citations.

"I wouldn't say it's harder, it's unusual but not harder." (Male, 20 years)

"It's more challenging of course but I'm studying here in engineering field so it's like, I would get all those scientific engineering terms anyway, so it's not that hard but it sometimes makes troubles especially if you have to do your own speech or write an essay in English." (Female, 20 years)

"No it isn't (harder to study in English). For me it's not because I'm quite used to hear English like all the time, on the media, internet, TV-shows, radio, all that. But for some students, I think it's problematical." (Male, 20 years)

"I think it's not (harder to study in English). It a good possibility to improve skills and to learn some technical words in another language. Maybe it will be needed in my future life. Of course there is a big difference (when studying in English) because if you have some questions, you can ask in English or then you can ask in your native or Estonian, like native for me. So I think it's more easier." (Male, 20 years)

"No, I don't think it's much harder, it's just... Few like... Few definitions or some parts are in English anyway." (Male, 21 years)

"At the beginning yes but later on, it's better." (Male, 20 years)

It is not typically an inappropriate occurrence if the language is giving some challenges. It can teach more than a student could get in a normal language lesson.

"If there is an English speaking teacher then I have to speak in English. I think this is a good thing, like you have to push yourself sometimes out of comfort zone and do the things you really don't like to do or feel comfortable doing like speaking

in English." (Male, 23 years)

"I think this is good in technical lessons because you have very much technical literature in English. I think this is good to learn in English." (Female, 23 years)

"Of course in some parts it is. It's more challenging.. And you can learn new things, and in my perspective, probably I'm going to abroad, take study in a wind energy... In Master's. Because Estonia doesn't have any that kind of thing that I want." (Male, 21 years)

"It has, like, pros and cons, but I think... Actually, I like studying in English, because I think in the future, it's, like, it's good, if you have studied in English." (Female, 20 years)

Presently we can talk about mass education in higher education and it has made our student population also more diverse [73]. Studying in English is becoming increasingly common. International students but also native students have courses in English all the time. Studying in a non-native language is not the same than reading in your language. If you are still learning the language, it may be difficult and time consuming to start studying the main subject. Some students are very fluent in English and there is not a major difference between their first language and English but some other students in the same class may have challenges to follow the teaching. [44] But why to teach courses in English if the majority could speak their native language? English is mentioned as an important part of a technical field. It is important to develop also language skills while developing the future of electrical engineering [9]. It is important to remember as a teacher that students do not feel their English skills as efficient as a teacher can see them. Some times even advantageous English speakers can hesitate to speak English and are underestimating their skills as the students represented the situation in interviews with the following comments.

"I know how to communicate and I know how to write but I'm not very fluent. I think I can speak OK." (Male, 20 years)

"I think they are moderate but I can manage..." (Male, 21 years)

"I guess, I'm pretty bad in talking... Maybe normal." (Male, 20 years)

"They are not so good but I try to work with my language. I think it takes some time." (Male, 20 years)

"Quite bad. Because in my high school I didn't have many English lessons... Like, basically everything I know and I speak, it's just like, I don't know, it just comes, come somewhere, like films." (Female, 20 years)

"Not very good but I understand and if I have this environment around me ... it would improve. But I can't imagine if mathematics analysis was in English. It would be way too hard." (Male, 21 years)

"Not so good. Any more. Because I haven't used English for a year or almost two years. And it's gone bad." (Male, 21 years)

"English skills... Very bad, really. I ... I don't have a big vocabulary. And, in my school, I... My teacher, my English teachers, all the time changed, and so every year we studied this basic grammar and other things so I... I can't just say something or explain. I understand but talking is very hard to me. " (Female, 20 years)

"Not so impressive. I'm not so good. I have passed my national exam and it was kind of OK but I didn't speak about 1,5 years... That's why my today's English speaking skills are like not good." (Male, 20 years)

"English, eh... This is not very good but I got some practise when I was in school projects in foreign countries in similar schools. I got some practise. Before that it was awful." (female, 23 years)

Part of the students can honestly say that they can speak and understand English very well. Language skills are usually highly appreciated.

"I like to think they are pretty good. That's it." (Male, 21 years)

"I would rank my English skills pretty high. I have been studying since kindergarten." (Male, 21 years)

"My English skill, spoken skill is quite good, written skill as well. I did an internship in a foreign country last summer. So I had three months I only spoke in English." (Male, 20 years)

"It's good, I think, because I've done the huge Cambridge tests and of course, I wanted to go abroad so I had to have this level of English to complete or to get good marks." (Male, 21 years)

"I wouldn't describe them excellent but I think they are good enough. My writing skills... Well... I practically manage... I think I could use some exchange student program in an English speaking country... So I would be more fluent." (Male, 21 years)

When mentioning diversity, we are talking about language, age, gender, cultural background, religion, work experience, learning preferences and physical ability [73]. Normally students who are studying in their own university, i.e. they are not exchange students, have normal social network in their use all the time. They do not

have cultural problems either because they can act normally. Of course it is possible that there are students with several cultural backgrounds in a course but usually native students do not suffer from the situation. Exchange student and students in a new environment do not have this benefit and they can have a lack of normal daily contacts, they do not know the rules and also language can cause problems when studying in English [21]. Even if a teacher would be a local teacher, the language may cause problems. At least many students think that there is a difference if a teacher can also speak students' native language even if teaching a course in English. The coming citations from the interviews represent the variety of the opinions.

"I think there is a difference. Because our teachers who teach in English... They speak English as a foreign language... So that's why it's sometimes hard to understand." (Male, 21 years)

"Yes, definitely. Because, accents differ very much depending the nationality of the speaker." (Male, 21 years)

"I think it's little easier when it's an Estonian teacher teaching in English because if you completely don't understand something you can ask in Estonian. But I think that students can manage with an English speaking teacher." (Male, 21 years)

"Maybe some lectures in English. But I think that exercises should be in a language, for me, what is fluent." (Male, 20 years)

"I think, it's better when, for teacher, it's a second, second language, you know, not his native language. Because, he can understand you if you have some problems... But is he's like a native speaker, he thinks that everybody has to know language perfectly and nobody has any problems. So, it's better when your teacher is, he is not native speaker." (Male, 20 years)

Furthermore, a part of the students seem to prefer foreign teachers, because of various reasons.

"I think a foreign teacher, in English, is a little bit better maybe. I think that our teachers can't speak English very well." (Female, 23 years)

"Foreign English (speaking) teachers are better." (Male, 20 years)

"I think it's better when the teacher isn't Estonian and speaking English. A foreign teacher who speaks English is better." (female, 20 years)

"It depends on his English level. Of course, I think it's pretty hard..." (Male, 21 years)

Alternatively, if a teacher is a native English speaker, it seems to be even better.

"There is definitely a difference. A native English speaker can usually form sentences much better than someone who has learnt English or learnt to give a class in English. This, he can speak English but hasn't learnt to speak English, so ... Like, you can't really explain it but it's definitely better, I think, if it's a native English speaker." (Male, 21 years)

"I think there is a difference if you have a native English speaker teacher. It depends if the English is not so good." (Male, 26 years)

5.6 Official and Unofficial Support

Surprisingly many students are not familiar with the resources and possibilities their campus and community could offer. Another problem is that there are typically some rumours and misinformation available. Students can feel uncomfortable to ask for help even if it would really be needed. Occasionally even asking questions and using the help from faculty's side after a lecture can be too difficult. Students may feel some fear or they are afraid that they would be categorized as stupid. [55] In this case peer learning and using peers in higher education can provide a new method of thinking their own problems. Frequently it is only one student who can ask a question but it is easy to read from others' faces that they all were thinking the same problem. Then there is clearly lack of information and no one should feel himself stupid. Communication with the faculty is the key here according to one student.

"The communication. I think if the teachers or any doctors or anyone would more communicate with a student about any possibility that we have or about options we could have or why some subject is important, of course because he's teaching us, but we can use it is this and this topic. It would be more useful." (Female, 20 years)

Students are looking for support for their studies from numerous sources. Older friends is one popular approach to success as the answers in the next quotations show.

"I get the needed support from older courses. We communicate with them, so if I have anything to ask concerning the studies or some exercise, I ask them because they have already done it. And it's much easier than to send an email to a teacher and arrange an appointment or meeting. It's quite easy." (Male, 21 years)

"I have used my friend who has already graduated. And he gave me some of his belongings. So, last year maths. They really helped me. Of course, connections, if you know someone is good at some area who studies in "another university", I can ask. Maybe study wisely friends." (Male, 21 years)

There are also some wider public supporting methods for studies. Students are

helping other students.

"In Estonia we have one web page where like all, where ever you study, there are very many, like school stuff. Students share it with each other. We got there some, like, very important documents, like students who have done some examination or something. They have pictured it or something." (Male, 20 years)

"We have our own system actually. The students are sharing materials from last years. From time to time I use that as well. It's like a cloud based thing where you can upload different things." (Male, 20 years)

If some basic facilities are lacking, students may feel that they are struggling. Someone may not own a printer and another would like to study more individually and try also own projects as shown in Figure 10. Also, when living in a dormitory, the public study areas in a university are getting increasingly important. Universities cannot satisfy all the possible wishes but some smaller tools may still produce a great difference in someone's studies as the students described in the next quotations in the interviews.

"I haven't used many facilities but a printing center would be nice if it was more updated. Currently it takes 10 minutes to get your document printed if you do it at school and not at home. Home I can print it in 30 seconds. Here it takes 10 minutes." (Male, 21 years)

"Free ability to use laboratory equipments where you could process your own ideas." (Male, 21 years)

"Maybe, maybe new things in a laboratory because you have really old, you know, technics in our laboratories. It's quite problematic. For example in one lab... So, we had 40-year-old things, so it was like, oh... Hard to work with them." (Male, 20 years)

"More individual study rooms... By time to time it's hard to get a group study room." (Male, 20 years)

Some sources of support are obvious and do not surprise anyone. It is still beneficial to remember, as a teacher, the techniques how students are currently finding information. If it does not gratify you, you may need to provide them with other materials or offer more tips where to find sources easily. The students are using simple and short answers when describing the main support sources as shown in the next citations.

"I think in internet and... Because there are many books and... And think my work helps me very much." (Female, 23 years)

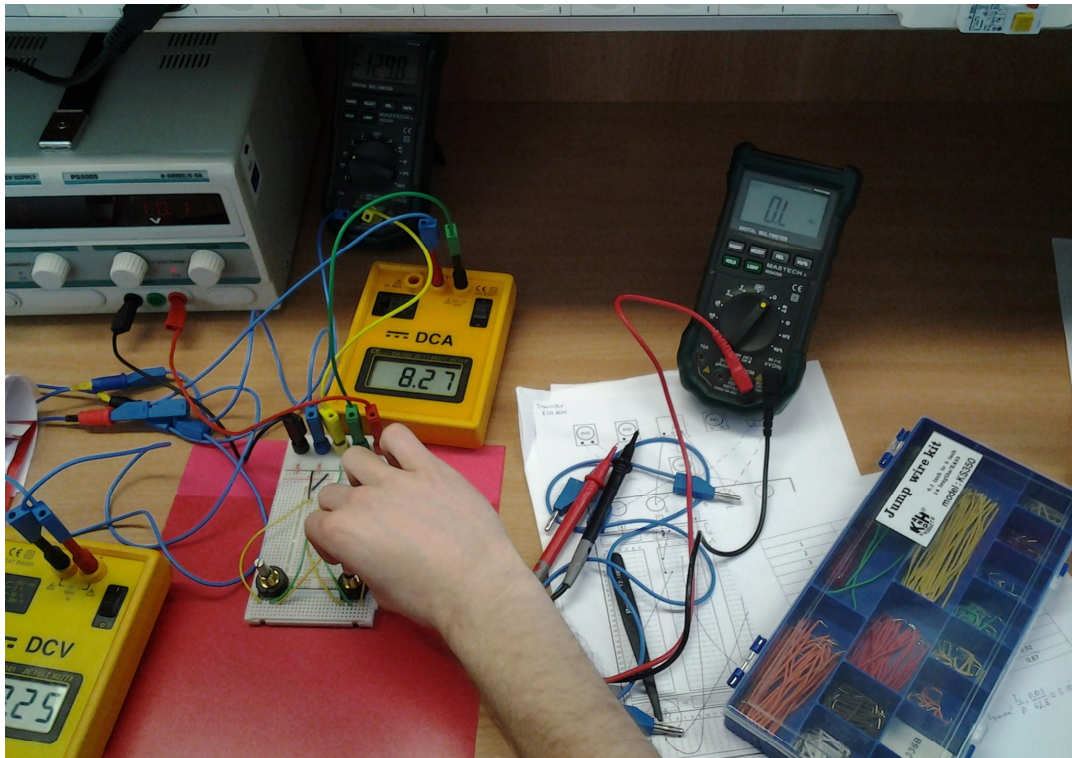


Figure 10: Students would like to test their skills and do their own measurements in a laboratory.

"Wikipedia, you get like a quick overview. I think especially the English one is very good. We are not allowed to use it as a source for any papers but getting quick overview whatever." (Male, 26 years)

"Google." (Male, 20 years)

Currently students and teachers have to deal with various types of tools than tens of years ago. Quite frequently students are more used to or more native to use those tools, such as Facebook and Twitter. We are talking about digital natives [61] or net-generation. This generation is well aware of the web usage in education. Students are frequently also ready to try on new technologies in education. Social networks have opened a new possibility for interaction also in more official procedure, not only in free time. [35]

Some courses use for example Facebook groups as a part of the course but not even one student mentioned it. Students either do not benefit on it at all or they do not count it as a part of studying. This forces a researcher to think that could there be something to develop on that side or if research or analysis of its benefits in learning is needed. The concept of using social media itself sounds very beneficial but maybe more marketing on that side might be needed.

6 The Faculty Point of View

Some university teachers in TUT were interviewed. The teachers asked not to publish the amount of interviews to keep them anonymous. The number of interviews would point the interviewed teachers. Interviews were performed because I wanted someone to describe their opinions and also to see if students' opinions and statements had something common with faculty side. All interviewed faculty members had teaching experience more than six years. They all teach something related to electronics and electrical engineering.

Many universities do not require an official pedagogical training for teachers in Europe but it has become increasingly common to require it [32][72][76]. In TUT, or in Aalto University either, there is not any clear requirements to have a certain level of pedagogical training or studies prior to one can teach. There are several options to have pedagogical studies and develop yourself as a teacher in Aalto University but it is not automatically required. Pedagogical training is a part of the continuous evaluation in the new tenure track system. In the future, more pedagogical readiness can be expected in Aalto.

Teachers can be divided in two categories by their teaching styles. If a teacher is more likely to transfer information, e.g. giving only passive lectures, a teacher has more teacher-centred approach to teaching. If a teacher is more likely to lead facilities, then a teacher has more student-centred approach to teaching. [63][38][23] There are several styles to teach, and not only one right style, but students seem to be in the center in electrical engineering in TUT as the next quotations from teachers' interviews indicate.

"I'm trying to get my talking speed down and talk less and let them figure it out themselves."

"The motivation, mostly I'm letting them to do the works and sometimes even when I'm doing let's say some examples, I accidentally, not purposely, but accidentally make some mistakes and they correct me actually. So that I can see that they are motivated to study. Also, other part how I'm motivating is that we try to do, let's say, laboratory work and exercise on the computer and everything works and then we try to apply it to a real life. So this gives them an opportunity to see how it's in real life used."

"I know something about my system, this active learning, to motivate them the more deeply and personally, and to achieve not only the high grade but real skills in their speciality."

Active learning has been under discussion and research in TUT already many years. One advantageous example of a well made research and results of active learning has been done in electrical engineering. In Figure 11 is shown how students got marks in quizzes during lectures in a course where active learning was an optional method to study and get a grade. L equals the number of students who did not

take part in the active learning and chose an exam at the end instead. M equals the number of students who gained middle scores. H equals high scores students and E the number of students who got excellent scores.

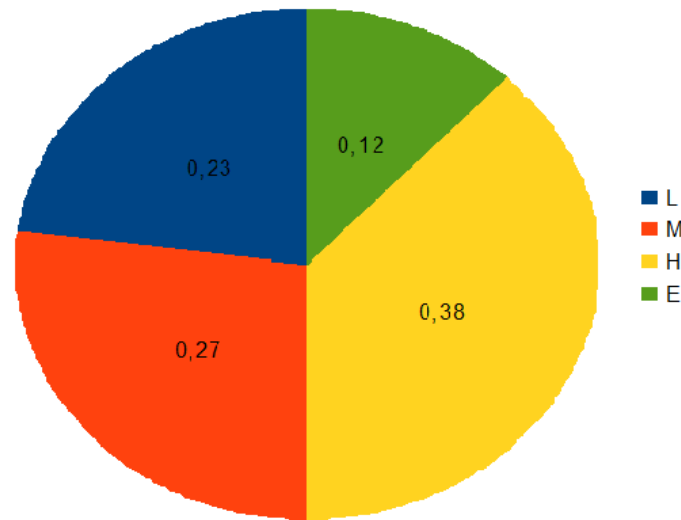


Figure 11: Averaged scoring of quizzes in active learning [66].

In Figure 12 is shown how students got marks in exercises and in Figure 13 are the results in laboratory assignments.

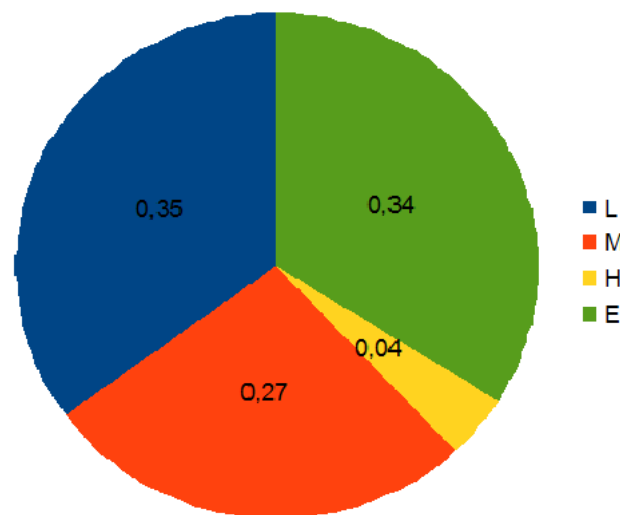


Figure 12: Averaged scoring of exercises in active learning [66].

As it can be seen, students are studying actively in the first two assignments. Quizzes during the lectures are easy to take and the only requirement is that a

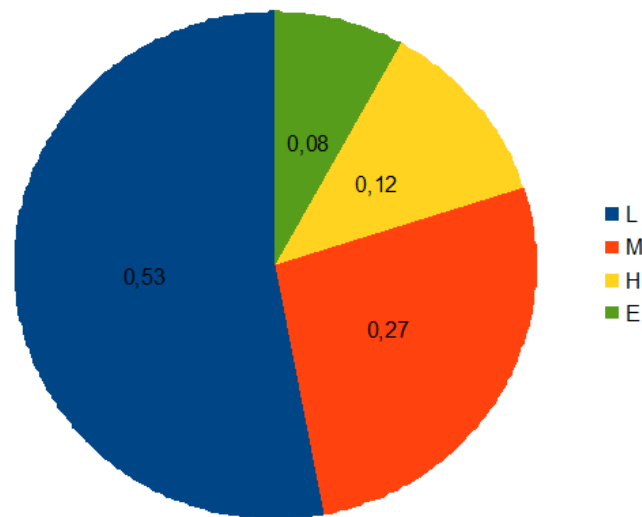


Figure 13: Averaged scoring of laboratory assignment in active learning [66].

student has to take part in the lecture. As some students told in the interviews, they appreciate quizzes and see them as an effective motivator to join a lecture. Many students see also exercises motivating and feel them as an important part of a course. It is appropriate to note that compared to the lectures, there are mandatory exercises and only voluntary exercises after the mandatory parts are giving active learning points. That may explain why somewhat more students are not joining active learning in this section.

The major issue seem to be laboratory assignments. Some students mentioned that quite frequently laboratory assignments are too structured and have too specific instructions that there are not much opportunities to be creative and think yourself. It may also be possible that students do not have enough time to complete optional parts, which are the active learning part, after doing mandatory assignments. It would be more important to encourage students to produce and process their own knowledge [62][78][38] and offer some more time to think what they are doing. That was also students' wish.

Teachers and assistants seem to appreciate the same features as students do when describing suitable teachers. Students mentioned several times the substance and knowledge of a teacher. It is quite obvious that teachers feel more comfortable when they know more about the subject. Some students thought that the teacher, his attitude and friendliness are still more important than the knowledge itself. The teachers' opinions are shown in the next citations from the interviews.

"I don't feel comfortable when I don't know what I'm talking about, actually. That is the hardest part. Because, then you have to show that you actually know something and can't show it to the students that you don't know."

"I think, first of all, professional specialist in his knowledge domain and he must be friendly. These two things are enough. Because you always must be ready to communicate with the other persons independently and the professional skills, I think, are also very important."

"Of course my knowledge, I think. I know enough and I understand enough, deeply, this subject... It depends on the auditorium plus also people who participate... and it's different from group to group."

"Also, I'm trying to be friendly and also I try to be open to the questions and answer the questions, and, for me, the students are not... divided to strong students and weak students. I try to look this question of the subject, which they are interested in, from their point of view, first of all. But also motivate people when he doesn't feel himself comfortable. He doesn't have the signals from the teacher: "I'm so stupid, I don't understand anything"."

Motivated teachers are as important as motivated students. The following quotations provides answers why teachers are working in TUT.

"I think it is, how to say, TUT is one university where I can develop my skills at my speciality. Because the other one, Tartu university, I think that there are no possibilities to do it. And other alternative, um, school are only, not universities, but some colleges."

"The main reason why I'm working at TUT started years ago. I have stayed here because I mostly have not so strict working hours and sometimes you can do something very different and not only teach. So you can also work in projects and do something new which you don't know."

Most of the students were not worried about their workload but some of them had noticed that there is not any kind of rule how much work is required. It is possible that students are lucky enough and some courses are that much lighter that they can manage also more time consuming courses with heavier workload. University could maybe control the system more if also faculty side is a bit uncertain about the workloads. The teachers described in the interviews the same unawareness of the ECTS as the next citations indicate.

"I have not thought about it, to be honest. I find that in one course the practical time and everything else is OK but in other course which actually is combining lot of stuff together it's not enough. In some courses you need more time so you should give more points, maybe, but in some other courses where you don't need, you should take down them. But this points versus time relation, I have not thought about it."

"It depends because... I think that it is more or less in this frame. Our additional exercises... I think that our main course is in the frame of the 26 hours. But it de-

pends on the students how they prepare the additional exercises, it depends on their skills. I can't estimate how much, in time, they spend."

Teachers can see also the other side of students' life. Some students do not pass all the courses which is normal. When talking about 55 credit limit per year we should take into account that not all the students have free living and may need to work along their studies. Students are not typically lazy or less willing to study. They may have other items to work with to survive in a normal daily life.

"One of the reasons, I think, for our students in Estonia is, they are, some of them, very busy. They need to earn money also. So, this is one of the problems, I think, in our Estonian higher education. Because the scholarship is, for some students, it's zero. And it depends on student's speciality also. I have an experience that if one time they can't pass the course, the next year, I think they are more motivated and it is a normal practise for me that the students who didn't pass the course from the first time, they have quite good grades on the next year."

Students cannot choose the language that is used in lectures and exercises. Teachers can mainly choose the language or at least refuse to teach a course in another language. Teachers who are now teaching in English do feel comfortable enough to do it as the next quotations from the interviews prove.

"English skills, oh, I think that it's enough for communication and I think that I've quite good know of terminology of my subject and I have also, um, how to tell, the vocabulary to explain to students this subject."

"Free talking OK, but sometimes I'm missing some words. I don't come up with that very fast and then I ask from some other students or I look it in web. But it's enough I would say, to talk and explain at least. And if they don't get it, then I'm asking again and if I don't get them then I ask them to explain me again."

7 Discussion

7.1 Target

The major renewing process in bachelor's degree in ELEC in Aalto University was the main motivator to start this project. Various ideas and solutions were found. The target was to find wider concepts and benefits from TUT but also some smaller details appeared over the others. The main focus was on the motivation and possibilities to achieve 55 ECTS per year in the future also in Aalto University.

The research questions, represented in the Section 3, were formulated to more easily understandable form and quantitative data were collected. A group of students were interviewed during the spring semester 2014. All the students had the same questions and the results were divided into categories. Studying methods such as active learning and other motivational aspects were on focus when the results were analysed.

First I will present some found differences between the universities. The differences are partly inconsequential and do not have major effects on studies. There are suitable habits and procedures in both Aalto and TUT which the other partner could include in their policies. After the differences I will discuss more about the results of the three research questions concerning on supporting students in gaining 55 ECTS per academic year, the motivational aspects on learning and the language effects on the willingness to study.

7.2 Differences in the Two Universities

The concept ECTS was not clear to many of the students in TUT. In contrast, in ELEC in Aalto University many students take actively part in school level meetings concerning on teaching. The students in Estonia seem to live totally separately with the faculty and organization. It may not be very common to take the students as a part of the organization but it may offer a fruitful channel for discussion and feedback between faculty and students.

Another difference is the more school system based teaching in TUT. This fact did not appear clearly in the interviews but was possible to state when discussing freely around the university and during the classes in the university. Compared to ELEC, they have more structured and school-like courses in TUT. The students in TUT did not question this type of studies in a university because they have used to study in that way. According to the interviews the students neither have strong opinions about their studies. The idea of this research is not to judge the main teaching and studying habits but it is important to notice that if this type of course management would be introduced in ELEC, it would not be possible after a year of study. The new system should be taken in the degree programs right at the beginning of the first year of the studies or students would possible struggle even more. The method how we teach them and how we condition them to study during the first year has a strong effect on their later studies.

7.3 Motivational Aspects

Surprisingly many students reported about teachers and their effect on motivation. This arouses a question if teacher do understand the effectiveness they have in their use. They can use it in positive or negative impact. In their capacity as a teacher, as the students described, they should have a variety of skills and types in character. According to the students, a good teacher should be for example friendly, cheerful, interactive, motivated, interested in the topic, helpful, polite, active, communicate a lot, ask questions, willing to listen and use different types of materials e.g. videos. A skilful teacher can also make lectures more interesting, have a lot on consultation hours, explain everything and not to expect that everyone has understood everything beforehand, take you as an equal and the the most important, a skilful teacher have a lot of knowledge of the subject and knows what he is talking about.

A teacher may have been an important factor in motivational aspects but learning by doing proved to have even more effect on the learning. The results obtained from the interviews showed that only three students out of 18 mentioned the term active learning but almost all the students described several learning and studying methods which may be counted as active methods. All the students had taken part in a course where active learning is used. Continuous assessment, for example laboratory assignments, exercises and quizzes almost every week, keep students studying actively. Several students mentioned courses where they have studied only at the final week because there has not been any control or structured evaluation during the course. Continuous assessment and learning keep the subject in their mind all the time and encourage to study actively.

According to the students, active learning does not signify only learning by doing. Lectures and other more passive methods are part of it. The students reminded that practical assignments are still a strong part of the learning process and more practical examples and own thinking in learning process is needed.

Simple statistical analysis was used to count the willingness to study abroad. As high percentage as 83.3% of the interviewees restated the eagerness to study abroad during their studies in university. Part of the students had already used this opportunity to expand their experiences in academic career. The willingness to study abroad could be associated with the modern-day academic work life when small markets in small countries, such as Estonia and Finland, require the knowledge of other countries and languages. The cultural aspects and international relations can be learned in a real life situation when studying abroad.

All the interviewed students had had at least one course in English in their degree. The students described their language skills in English language mostly moderate. This did not cause a surprise because the Finnish and Estonian cultures are very similar and people are mostly modest when concerning the talk on their skills. The students had faced a few problems in their studies because of the language. The problems focused on thinking in two language, impossibility of speed reading and the amount of technical terms. However, only few students experienced serious problems and other students took the language more as a challenge. Most of the students conceived the foreign language as an extra part of a course and tried to

benefit of the practice of the language. The students understood that they will need English in the future and were contented with the practice during their studies. As a researcher and an interviewer it is important to mention that only one student was struggling with the language in the interview. All other students were able to speak and express themselves fluently and without worth mentioning problems. It may be fruitful for the students to receive feedback about their written reports also from the the English teacher concerning on the language. It could help the students to understand their real language skills and believe that they are on an exquisite level.

The students depicted teachers' English skills with numerous words. The language divided the interviewed students into two groups. The first group of students would like to listen to a native English speaker and the other group of students would appreciate if a teacher can speak also students' native language. This implies that the first group of students have considerable English skills and they are willing to develop their language skills more. The other group of the students is more insecure and want to keep the possibility to ask questions also in their native language.

The majority of the interviewees who responded positively to the question of the international studies mentioned also real life situations in the class rooms. The majority of the students experienced that the real life related examples and exercises support the learning process and help to keep the motivation higher. Practical abilities are lacking in the degree program according to several responses. Furthermore, the students thought that it is easier to understand and use more complicated theories if they have seen them somewhere in use. Real life examples can be computer-aided exercises or for example excursions to the companies operating in that field.

The last noteworthy subject is that the study found that the workload of a course has the impact on the motivation and willingness to study. The interviewees seemed to be interested in their studies and that was the main motivation. When the subject is interesting, a student may use more time than required to gain the wanted result. The students did not mainly complain about the requirements of their studies and were willing to study and spend the required time. However, they have noticed several disadvantages in the workloads of their courses. It was easy to see the attitude against a course when two students mentioned the same course but had totally different opinion about the workload. Both students agreed that the mentioned course had a serious problem in the workload but one student felt that the course is important and interesting and thought that it was not a problem to spend more time with it. The other student did not see the benefits of the course and suffered from the wasted time, as he said.

The students appreciated the work the teachers do and are satisfied when they have homework. It is a sign that someone cares and wants them to learn. They also appreciate that the course is well structured and they know the goal beforehand. However, some interviewees described some situations when a teachers requires absolutely too much and expects that all the homework is always ready when required. Too much work and too high requirements were mentioned in some of the interviews. It is important to mention here that overall the students did not see the courses too

heavy and stressful. Most of the students estimated to use a lot less time than the ECTS requirements suggest in most of the courses.

The students did not appreciate official or unofficial support as much as expected. They described some situations and desires how to support them more. The main need was communication and part of the interviewees suffered from lack of it. The students announced that their main source of support is the older students in the same university and the internet and its services. This result does not surprise because both channels are easy to achieve, open to everyone and free of charge.

The interviewed students found several deficiencies and developmental ideas how to help and support their studies without infeasible costs. The students mentioned basic level problems which are complicating their studies or taking extra time. The main deficiencies the students found were the printers and free use of a laboratory equipment. The printers may cause problems when a student do not own a printer and most of the active learning courses require printed reports almost every week. The most active students were also willing to build their own projects and practise the achieved knowledge in real circuits and systems. They were lacking a place where to measure and build circuits because the equipment are unquestionably too expensive to buy yourself.

7.4 Later Benefits in ELEC

The process of renewing the bachelor level courses has started in ELEC and the first new courses have operated over the year 2013-2014. The next set of courses is ready to start and new ideas have been adopted into second year courses in electronics. Active learning and continuous assessment over the courses are firmly as a part of the courses. According to the student interviews, remarkable changes has been done.

The new courses in electronics are not only exam and lecture based any more. The courses consist of lectures, exercise hours after every lecture, simulation assignments four times per semester and laboratory assignment twice per semester. Two mid-term exams are held and every lecture has a short quiz during the last minutes. All the mentioned learning opportunities are part of the evaluation process. A student cannot pass the course joining the final exam only. An active participation during the 14 weeks of the course is needed to achieve a good grade. The course is overall more guided and controlled than earlier.

8 Conclusions

This study has been a success and the target has been achieved. However, there are always several details that could be completed better. The first aim was to collect also quantitative data and questionnaires for the students were already formulated. Unfortunately the data was too concise for this type research and it was not possible to use it. Mercifully sufficiently interviews could be collected and the qualitative data was comfortable to collect and analyse.

In the future it is interesting to compare the old and new courses in ELEC. There has been research concerning of the study results and success in studies in the courses of electronics. After the new courses have served some years, it is possible to compare the results. It would be useful to collect student interviews when the ELEC bachelor program have been in use for the whole three years' time. In that situation, we could study whether the students at ELEC have similar opinions and reactions in comparison to TUT described in this study.

References

- [1] E. Alpay, A. L. Ahearna, R. H. Grahama and A. M.J. Bulla, "Student Enthusiasm for Engineering: Charting Changes in Student Aspirations and Motivation," *European Journal of Engineering Education*, vol. 33, no. 5-6, pp. 573 –585, 2008.
- [2] A. C. Aparicio and A. M. Ruiz-Teran, "Tradition and Innovation in Teaching Structural Design in Civil Engineering," *Journal of Professional Issues in Engineering Education and Practice*, vol. 133, no. 4, pp. 340 –349, 2007.
- [3] H. Arksey and P. Knight (eds.), *Interviewing for Social Scientists*, Sage, UK, 1999.
- [4] C. Baillie and G. Fitzgerald, "Motivation and Attrition in Engineering Students," *European Journal of Engineering Education*, vol. 25, no. 2, pp. 145 –155, 2000.
- [5] R. F. Bales, *Interaction Process Analysis: a Method for the Study of Small Groups*, Addison-Wesley, UK, 1950.
- [6] M. Beergens, M. Mägi and L. Lill, "University Studies as a Side Job: Causes and Consequences of Massive Students Employment in Estonia," *Higher Education*, vol. 61, pp. 679 –692, 2011.
- [7] F. J. Bellido, J.-M. Flores-Arias, M. Linan and A. Moreno-Muñoz, "Active Learning in Power Electronics," *1 st Annual Global Engineering Education Conference IEEE EDUCON, Madrid, Spain*, 2010.
- [8] R. Bennetta, "Determinants of Undergraduate Student Drop Out Rates in a University Business Studies Department," *Journal of Further and Higher Education*, vol. 27, no. 2, pp. 123 –141, 2003.
- [9] F. C. Berry, P. S. DiPiazza and S. L. Sauer, "The Future of Electrical and Computer Engineering Education," *Transactions On Education*, vol. 46, no. 4, pp. 467 –476, 2003.
- [10] J. Biggs, *Student Approaches to Learning and Studying*, Victoria: Australian Council for Educational Research, 1999.
- [11] J. Biggs, D. Kember and D. Y. P. Leung, "The Revised Two-Factor Study Process Questionnaire; R-SPQ-2F," *British Journal of Educational Psychology*, vol. 71 pp. 133 –149, 2001.
- [12] P. Bridges, A. Cooper, P. Evanson, C. Haines, D. Jenkins, D. Scurry, H. Woolf and M. Yorke, "Coursework Marks High, Examination Marks Low: Discuss," *Assessment and Evaluation in Higher Education*, vol. 27, no. 1, pp. 35 –48, 2002.
- [13] D. Boud, *Developing Student Autonomy in Learning*, Kogan Page, UK, 1998.
- [14] B. J. Calder, "Focus Groups and the Nature of Qualitative Market Research," *Journal of Marketing Research*, vol. 14, pp. 353 –364, 1977.

- [15] K. Chapman, "An Analysis of Degree Results in Geography by Gender," *Assessment and Evaluation in Higher Education*, vol. 21, no. 4, pp. 293 –313, 1996.
- [16] S. Clifford, *Tipsheet - Qualitative Interviewing*, DISM Research Associate.
- [17] C. A. Coker, "Learning Style Consistency Across Cognitive and Motor Settings," *Perceptual and Motor Skills*, vol. 81, pp. 1023 –1026, 1995.
- [18] J. L. Cooper, J. McGregor, K. A. Smith and P. Robinson, "Implementing Small-group Instruction: Insights from Successful Practitioners," *New Direction for Teaching and Learning*, vol. 81, pp. 63 –76, 2000.
- [19] C. Dalton-Puffer, T. Nikula and U. Smit, *Language Use and Language Learning in CLIL Classrooms*, John Benjamins Publishing Company, USA, 2010.
- [20] R. DeBard, "Millennials coming to college," *New Directions in Student Services*, vol. 106, pp. 33 –45, 2004.
- [21] Y. R. Dong, "Non-native Graduate Students' Thesis/Dissertation Writing in Science: Self-reports by Students and Their Advisors from Two U.S. Institutions," *English for Specific Purposes*, vol. 17, no. 4, pp. 369 –390, 1998.
- [22] K. Edström, 'Student Feedback in Engineering' In C. S. Nair, A. Patil and P. Mertova (Eds.) *Enhancing learning and teaching through student feedback*, Chandos Publishing, UK, 2012.
- [23] M. E. Eley, "Teachers' Conceptions of Teaching, and the Making of Specific Decisions in Planning to Teach," *Higher Education*, vol. 51, pp. 191 –214, 2006.
- [24] N. Entwistle, *Teaching for Understanding at University*, Palgrave MacMillan, UK, 2009.
- [25] N. J. Entwistle, *Styles of Learning and Teaching: An Integrated Outline of Education Psychology for Students, Teachers and Lecturers*, David Fulton, UK, 1988.
- [26] N. J. Entwistle, J. B. Nisbet and A. Bromage, *TETL Subject Area Report on Electronic Engineering*, www.etl.tla.ed.ac.uk/publications.html, 2006.
- [27] K. Ercikan and W.M. Roth, "What Good Is Polarizing Research Into Qualitative and Quantitative?," *Educational Researcher*, vol. 35, no. 5, pp. 14 –23, 2006.
- [28] European Commission, *The structure of the European education systems 2013/14: schematic diagrams*, 2013.
- [29] H. Fennes and K. Hapgood, *Intercultural Learning in the Classroom*, Cassell, UK, 1997.

- [30] H. Fry, S. Ketteridge and S. Marshall, J. B. Nisbet and A. Bromage, *A Handbook for Teaching and Learning in Higher Education*, Routledge, UK, pp. 27 –30, 2009.
- [31] H. Geyser, *Learning from Assessment*, in *S. Gravett and H. Geyser (Eds.), Teaching and Learning in Higher Education*, Van Schaik, South Africa, 2004.
- [32] G. Gibbs and M. Coffey, "The Impact of Training of University Teachers on Their Teaching Skills, Their Approach to Teaching and the Approach to Learning of Their Students," *Active Learning in Higher Education*, vol. 5, pp. 87 –100, 2004.
- [33] J. Gubrium and J. Holstein (eds.), *Handbook of Interview Research*, Sage, UK, 2001.
- [34] Ö Hajtó and al., *Engineering Education and Professional Activity of Engineers in Europe*, Logod Bt., Hungary, 2000.
- [35] K. F. Hew, "Students' and Teachers' Use of Facebook," *Computers in Human Behavior*, vol. 27, no. 2, pp. 662 –676, 2011.
- [36] N. Howe and W. Strauss, *Millennials Rising: The Next Great Generation*, New York: Vintage, USA, 2003.
- [37] W. Hörner, H. Döbert, B. von Kopp and W. Mitter, *The Education Systems in Europe*, Springer, UK, pp. 237 –261, 2007.
- [38] D. Kember and K. Kwan, "Lecturers' Approaches to Teaching and Their Relationship to Conceptions of Good Teaching," *Instructional Science*, vol. 28, pp. 469 –490, 2000.
- [39] F. N. Kerlinger, *Behavioral Research*, Holt, Rhinehart & Winston, USA, 1979.
- [40] D. A. Kolb, *The Kolb Learning Style Inventory*, Hay Group, USA, 1999.
- [41] S. Kvale, *Interviews: An Introduction to Qualitative Research Interviewing*, SAGE Publications, USA, 1996.
- [42] G. Light, R. Cox and S. Calkins, *Learning and Teaching in Higher Education*, SAGE Publications Ltd., UK, 2009.
- [43] Y. S. Lincoln and E. Gub, *Naturalistic Inquiry*, Sage, USA, 1985.
- [44] R. Lowes, H. Peters and M. Turner, *The International Student's Guide: Studying in English at University*, SAGE Publications Ltd, UK, pp. 20 –39, 2004.
- [45] J. Marks, *Girls Know Better: Educational Attainment of Boys and Girls*, Civitas, UK, 2001.
- [46] A. J. Martin, "The Student Motivation Scale: Further Testing of an Instrument that Measures School Students' Motivation," *Australian Journal of Education*, vol. 47, no. 1, pp. 88 –106, 1999.

- [47] J. A. Mather and A. Champagne, *Student Learning Styles / Strategies and Professors' Expectations: Do They Match?* in W. Y. Lee (Ed.), *Assessment and Evaluation in Higher Education*, Pearson Learning Solutions, USA, pp. 351–358, 2010.
- [48] J. F. H. Meyer and R. Land, *Overcoming Barriers to Student Understanding: Threshold Concepts and Troublesome Knowledge*, Routledge, UK, 2006.
- [49] J. A. Michael and H. I. Modell, *Active Learning in Secondary and College Science Classrooms*, Lawrence Erlbaum Associates Inc., USA, 2003.
- [50] J. Mikkonen, M. Ruohoniemi and S. Lindblom-Ylänne, "The Role of Individual Interest and Future Goals During the First Years of University Studies," *Studies in Higher Education*, vol. 38, no. 1, pp. 71–86, 2013.
- [51] Ministry of Education and Culture, 20.4.2012/182, 2013.
- [52] J. E. Mitchell and J. Smith, "Case Study of the Introduction of Problem-based Learning in Electronic Engineering," *International Journal of Electrical Engineering Education*, vol. 45, no. 2, pp. 131–143, 2008.
- [53] P. H. Mussen, J. J. Conger and J. Kagan, *Child Development and Personality*, Harper & Row, USA, 1977.
- [54] S. E. Newstead, A. Franklyn-Stokes and P. Armstead, "Individual Differences in Student Cheating," *Journal of Educational Psychology*, vol. 88, pp. 229–241, 1996.
- [55] F. B. Newton and S. C. Ender, *Students Helping Students: A Guide for Peer Educators on College Campuses*, Jossey-Bass, USA, 2010. (pp.130-135 pp. 248-249)
- [56] N. Noddings, "Is Teaching a Practice," *The Journal of the Philosophy of Education*, vol. 37, no. 2, pp. 241–251, 2003.
- [57] OECD, *Reviews of national policies for education: Estonia*, OECD Publications, France, 2001.
- [58] O. Patterson, *Context and Choice in Ethnic Allegiance: A Theoretical Framework and Caribbean Case Study*, in N. Glazer and D. P. Moynihan (Eds.), *Ethnicity: Theory and Experience*, Harvard University Press, USA, 1975.
- [59] G. Piane, R. J. Rydman and A. J. Rudens, "Learning Style Preferences of Public Health Students," *Journal of Medical Systems*, vol. 20, no. 6, pp. 377–384, 1996.
- [60] P. R. Pintrich and al., "Reliability and Predictive Validity of the Motivated Strategies for Learning Questionnaire (MSLQ)," *Educational and Psychological Measurement*, vol. 53 pp. 801–813, 1993.

- [61] M. Prensky, "Digital Natives, Digital Immigrants," *From On the Horizon*, vol. 9, no. 5, 2001.
- [62] M. Prosser and K. Trigwell, *Understanding Learning and Teaching: The Experience in Higher Education*, Society for Research into Higher Education and Open University Press, UK, 1999.
- [63] M. Prosser, K. Trigwell and P. Taylor, "A Phenomenographic Study of Academics' Conceptions of Science Teaching and Learning," *Learning Instruction*, vol. 4, pp. 217–231, 1994.
- [64] E. Rantanen and E. Liski, *Valmiiksi Tavoiteajassa?*, HSE Print, Finland, 2008.
- [65] Z. Raud, "Improving Laboratory Training in Power Electronics,," *8th International Symposium, Topical Problems in the Field of Electrical and Power Engineering, Doctoral School of Energy and Geotechnology II, Pärnu, Estonia*, 2010.
- [66] Z. Raud, *Research and Development of an Active Learning Technology for University-Level Education in the Field of Electronics and Power Electronics*, TUT Press, Estonia, 2012.
- [67] R. M. Ryan and E. L. Deci, "Self-determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-being," *American Psychologist*, vol. 55, pp. 68–78, 2000.
- [68] E. Saar and R. Möttus, *Higher Education at a Crossroad: The Case of Estonia*, Germany, pp. 11–14, 2013.
- [69] P. Sander, K. Stevenson, M. King and D. Coates, "University Students' Expectations of Teaching," *Studies in Higher Education*, vol. 25, no. 3, pp. 309–323, 2000.
- [70] M. Savin-Baden, "Problem-Based Learning in Electronic Engineering: Locating Legends or Promising Problems?," *International Journal of Electrical Engineering Education*, vol. 45, no. 2, pp. 96–109, 2008.
- [71] C. Seale(ed.), *Researching Society and Culture*, Sage, UK, 1998.
- [72] A. Sonesson and A. Lindberg Sand, "The Impact of Training of University Teachers on Their Teaching Skills, Their Approach to Teaching and the Approach to Learning of Their Students," *6th Conference of the International Consortium for Educational Development, Sheffield*, 2006.
- [73] M. Tennant, C. McMullen and D. Kaczynski, *Teaching Learning and Research in Higher Education*, Routledge, USA, 2010.
- [74] E. Tõnisson, *Kõrghariduse Valdkonna Statistiline Ülevaade 2011 [Statistical overview of higher education 2011]*, Tartu, Estonian Ministry of Education and Research, 2011.

- [75] R. J. Vallerand and al., "The Academic Motivation Scale: A Measure of Intrinsic, Extrinsic and Amotivation in Education," *Educational and Psychological Measurement*, vol. 52 pp. 1003 –1017, 1992.
- [76] H. van Keulen, "Staff Development and Basic Teacher Qualification Systems in The Netherlands, with a Focus on Utrecht University," *6th Conference of the International Consortium for Educational Development*, Sheffield, 2006.
- [77] J. D. Vermunt and Y. J. Vermetten, "Patterns in Student Learning: Relationships Between Learning Strategies, Conceptions of Learning and Learning Orientations," *Educational Psychology Review*, vol. 16, no. 4, pp. 359 –384, 2004.
- [78] J. D. Vermunt and N. Verloop, "Congruence and Friction Between Learning and Teaching," *Learning and Instruction*, vol. 9, pp. 257 –280, 1999.
- [79] C. Warren, *Gender Issues in Field Research*, Sage, USA, 1988.
- [80] D. H. Wulff and A. E. Austin, *Paths to the Professoriate: Strategies for Enriching the Preparation of Future Faculty*, Jossey-Bass, USA, 2004.

A

Face-to-Face Interview for a Student

A.1 Background

1. How old are you?
2. What is your nationality?
3. What is your native language?
4. How many years you have studied in an university, also others than in TTU?
5. Are you studying in a bachelor's or master's programme?

A.2 About Your Skills in English Language

1. Why did you choose TUT?
2. How would you describe your English skills?
3. Do you have many courses in English in your degree?
4. Is it harder to study in English?
5. Is there a difference if the teacher is an Estonian speaking English or a foreigner speaking English?
6. Do you use English in your free time?
7. Are you interested in to study abroad?
8. (Have you thought to do a doctoral degree in the future?)

A.3 About Your Studies

1. What makes a course comfortable and why?
2. What causes a loose of motivation? In a course and in other context
3. If you could freely choose what you are studying in TUT, would you change some courses? Why, and what you would study instead of it
4. What has been the best course in your studies and why?
5. How would you describe a good teacher or an assistant?
6. How would you describe your behaviour as a student in the university? Are you more active or passive, joining everything or doing just what you have to
7. What kind of teaching or learning methods you prefer?

8. Do you usually study alone or in a group?
9. Could you describe the main reasons that have caused problems in your studies in the university?

A.4 Motivation and Workload

1. According to the guidelines, one credit (ECTS) requires 26 hours of student work in TUT. Do you usually use more or less time per credit?
2. How many credits you usually achieve per one academic year?
3. What kind of facilities or support from university or staff could support your leaning?
4. What is the main unofficial source of support you use? Something that does not come from your university
5. Could you name the main reason why a course is not motivation?
6. And why a course is motivation?
7. What kind effect the evaluation has on your motivation?
8. Do you see mandatory exercises, laboratory assignments etc. motivating?

B

Face-to-Face Interview for a Faculty Member

B.1 Background

1. What is the main subject you teach?
2. How many hours per week you normally teach?
3. Do you teach mostly in a bachelors', masters' or post-graduate courses?
4. Do you give courses also in English?
5. How would you describe your English skills?
6. Why are you working in TUT?

B.2 About Your Teaching

1. What makes you feel comfortable to give a course?
2. How do you keep students' motivation high?
3. What do you think are the main reasons why some students do not pass your courses?
4. What has been the best course you have given and why?
5. How would you describe a good teacher or an assistant?
6. What kind of teaching methods you prefer and why? Tell also about the limits if you cannot normally use them
7. According to the guidelines, one credit (ECTS) requires 26 hours of student work in TUT. Do you usually require more or less time per credit in your courses?
8. Could you name the main reason why a course is not motivating students (not your course)?
9. And why a course is motivating?
10. What kind evaluation or assessment do you use in your courses?
11. Would you do something in a different way if it would be possible? For example not required by the university or limited by time